

GYNÆCOLOGY
FOR NURSES
AND
GYNÆCOLOGICAL NURSING

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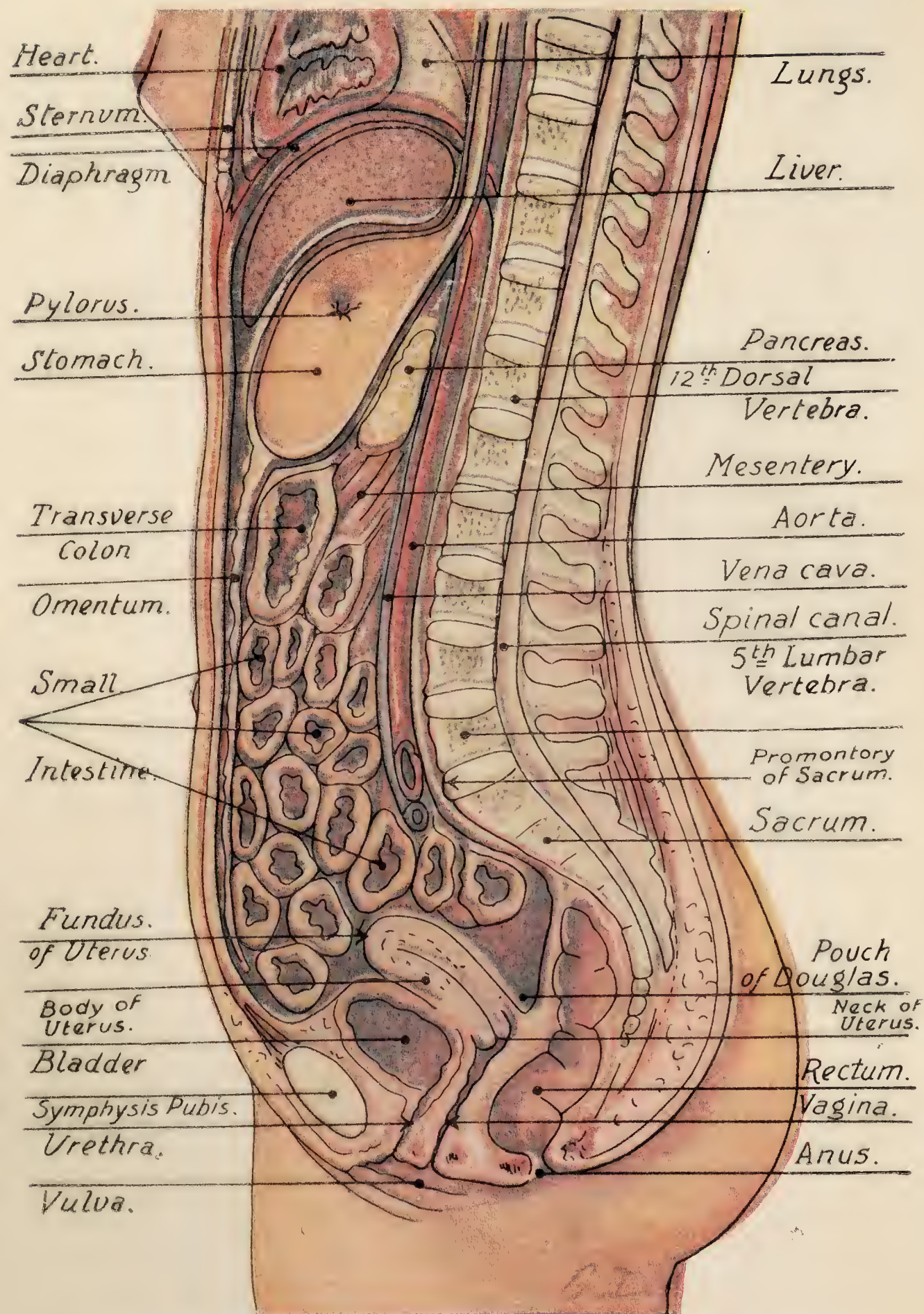
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GYNÆCOLOGY FOR NURSES
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SECTION THROUGH THE FEMALE BODY SHOWING THE PECTORAL, ABDOMINAL, AND PELVIC ORGANS.

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GYNÆCOLOGY FOR NURSES

AND

GYNÆCOLOGICAL NURSING

INCLUDING THE SUBJECTS ENUMERATED, UNDER GYNÆCOLOGY
AND OBSTETRICS, IN THE "SYLLABUS OF LECTURES AND
DEMONSTRATIONS FOR EDUCATION AND TRAINING IN GENERAL
NURSING" ISSUED BY THE GENERAL NURSING COUNCIL

BY

COMYNS BERKELEY

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EXAMINER IN MIDWIFERY AND DISEASES OF WOMEN TO THE UNIVERSITIES OF BRISTOL
CAMBRIDGE, GLASGOW, AND TO THE CENTRAL MIDWIVES BOARD

LATE EXAMINER IN MIDWIFERY AND DISEASES OF WOMEN TO THE UNIVERSITIES OF

LEEDS, LIVERPOOL, LONDON, MANCHESTER, OXFORD, SHEFFIELD AND WALES,

TO THE CONJOINT BOARD OF ENGLAND, AND TO THE SOCIETY OF
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FIFTH EDITION

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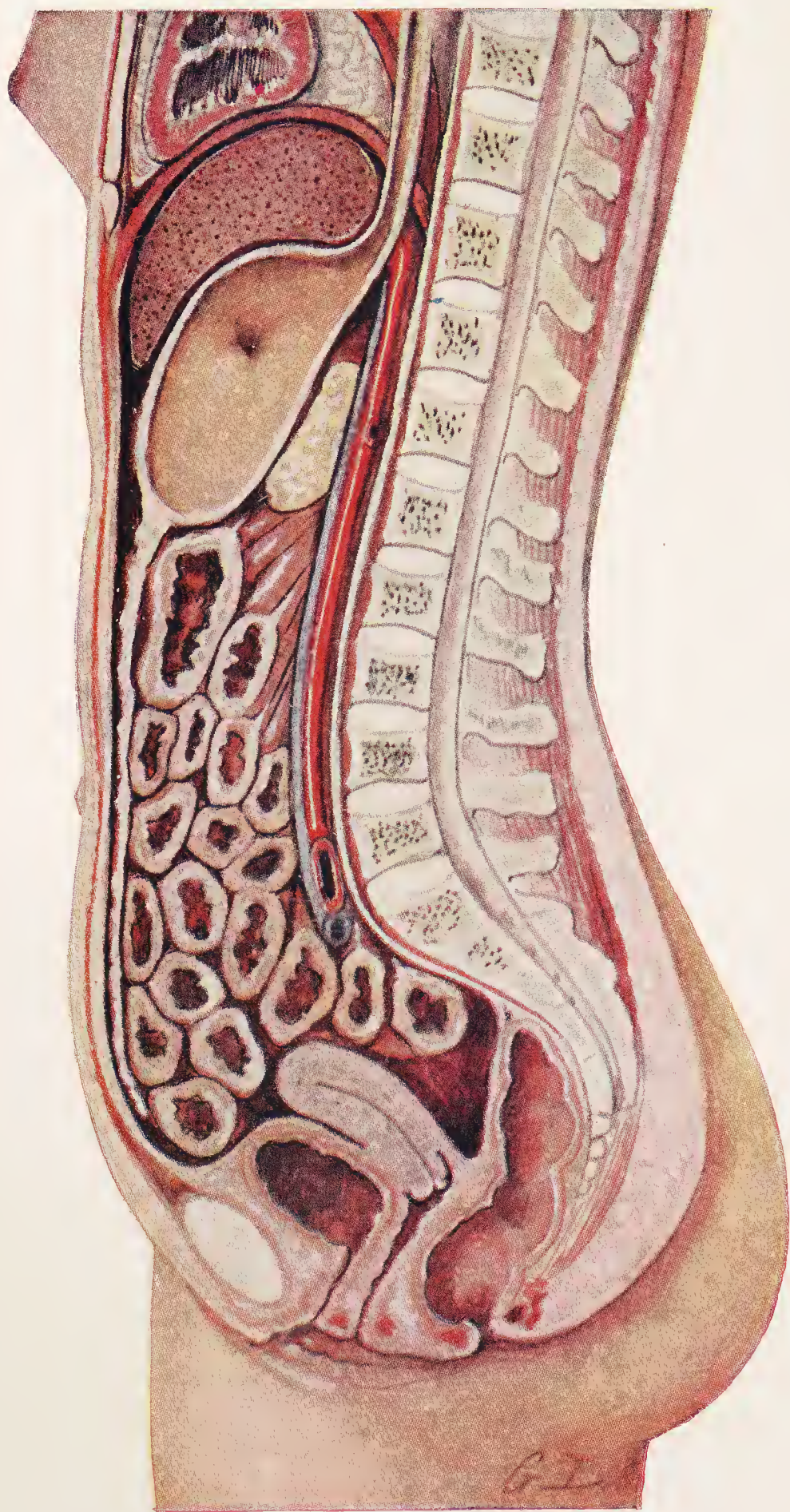


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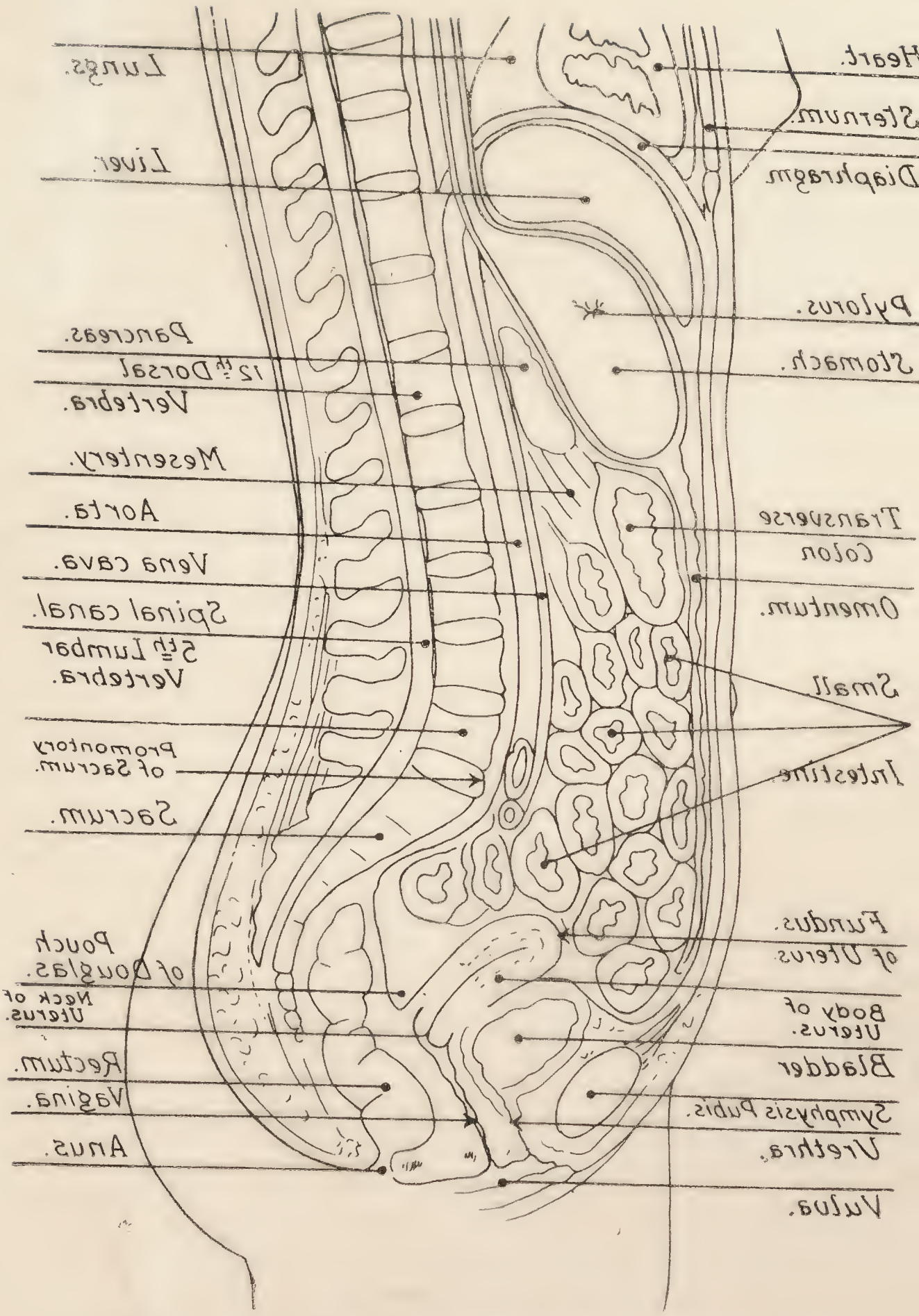
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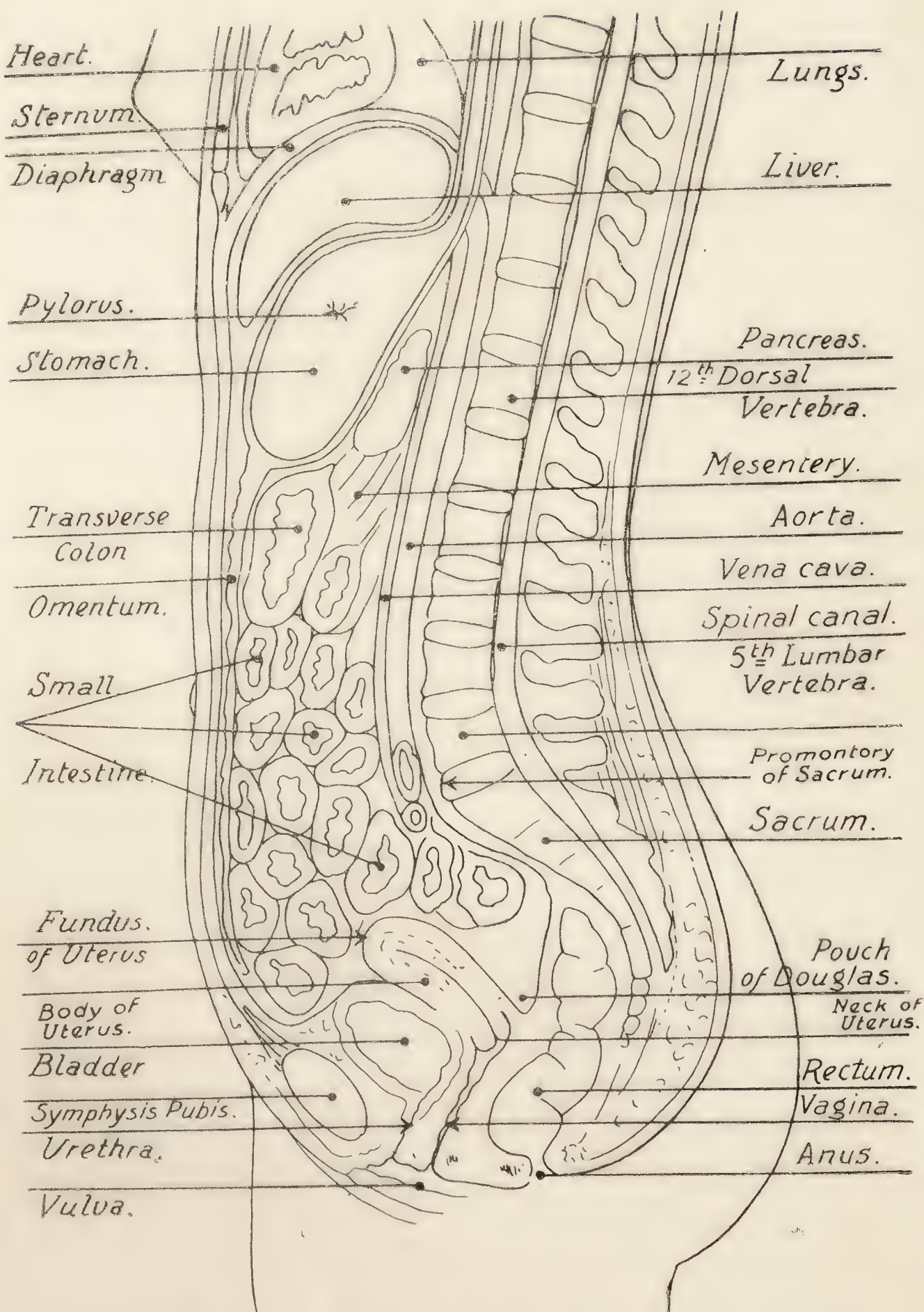
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SECTION THROUGH THE FEMALE BODY SHOWING THE PECTORAL, ABDOMINAL, AND PELVIC ORGANS.





SECTION THROUGH THE FEMALE BODY SHOWING THE PECTORAL, ABDOMINAL, AND PELVIC ORGANS.

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First Edition . . . 1910
Fourth Edition . . . 1925
Reprinted . . . 1927
Fifth Edition . . . 1929



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PREFACE TO FIRST EDITION.

THE following pages contain the substance of the lectures it has been my privilege to deliver to the senior nurses of the Middlesex Hospital and the Chelsea Hospital for Women during the past twelve years. In these lectures I have endeavoured to set forth the principal facts concerned with the more common diseases peculiar to women and the chief points to be observed in gynæcological nursing, a knowledge of which is so essential to any properly trained nurse.

The subjects chosen have not been in any way exhaustively dealt with, but I think their discussion must have served a useful purpose, since this small volume is published at the request of many nurses who have attended the course of lectures it embodies.

C. B.

WIMPOLE STREET, W.

1910

PREFACE TO THE FIFTH EDITION.

THE fifth edition of this book has been thoroughly revised and in several parts rewritten. The author is indebted to the Sister Tutors of many of the training schools for nurses in London and the Provinces for suggestions they kindly sent to him. In consequence much new matter has been added in this edition, more particularly with reference to X-Ray Therapy, the application of Radium, the injection of Novarsenobillon and Blood Transfusion. Some new illustrations and a coloured frontispiece have also been included. I am much obliged to Miss M. L. Sparkes, Sister of the Maternity Wards at the Middlesex Hospital, for compiling the Glossary, and to Miss B. Haughton, the Assistant Matron of the Middlesex Hospital, for reading the proof sheets. My thanks are also due to Dr. L. E. H. Whitby, author of *The Nurses' Handbook of Hygiene*, for assistance in the revision of the section on Infection, and to Mr. W. Turner Warwick, author of *A Handbook on Venereal Diseases*, from which book I have extracted a few details connected with the administration of Novarsenobillon.

COMYNS BERKELEY

February, 1929

CONTENTS.

PREFACE TO FIRST EDITION	PAGE v
PREFACE TO THE FIFTH EDITION	vi

PART I.

ANATOMY.

CHAP.

I. STRUCTURE OF THE FEMALE PELVIS, GENITAL ORGANS, BREASTS, URINARY ORGANS, AND RECTUM	1
--	---

PART II.

PHYSIOLOGY.

II.	20
-------------	----

PART III.

PREGNANCY.

III. FERTILIZATION	29
IV. ANTENATAL CONDITIONS	40
V. TOXÆMIA OF PREGNANCY	45

PART IV.

PARTURITION.

VI. STAGES OF LABOUR. POST-PARTUM HÆMORRHAGE .	59
VII. EXTRA-UTERINE GESTATION	79

PART V.

DISEASES OF THE REPRODUCTIVE TRACT.

CHAP.	PAGE
VIII. ABNORMAL MENSTRUATION	86
IX. VAGINAL DISCHARGES	119
X. DISPLACEMENTS OF THE UTERUS AND THE USE OF PESSARIES	129
XI. DISTURBANCES OF MICTURITION	147
XII. INFECTION	156
XIII. IMMUNITY	166
XIV. ASCENDING INFLAMMATION	179
XV. SEPTICÆMIA	193
XVI. SYPHILIS	200
XVII. TUMOURS AND NEW GROWTHS	211

PART VI.

GYNÆCOLOGICAL NURSING.

THE BEARING OF A NURSE	249
XVIII. METHODS OF STERILIZATION	251
XIX. POSITION OF THE PATIENT FOR EXAMINATION OR OPERATION	256
XX. VAGINAL DOUCHING AND TAMPONADING, CATH- ETERIZATION, WASHING OUT THE BLADDER, SALINE INFUSIONS	266
XXI. PRE-OPERATIVE EXAMINATION AND PREPARATION OF THE PATIENT	299
XXII. THE ASEPTIC TECHNIQUE	309
XXIII. SURGICAL INSTRUMENTS THAT WILL PROBABLY BE REQUIRED FOR THE VARIOUS GYNÆCO- LOGICAL OPERATIONS	339
XXIV. CARE OF THE PATIENT IN TRANSIT FROM THE WARD TO THE ANÆSTHETIZING ROOM AND FROM THE THEATRE TO THE WARD	360
XXV. ASEPTIC TECHNIQUE FOR OPERATIONS IN A PRIVATE HOUSE	364
XXVI. PREPARATION OF THE NURSE, PLACING THE PATIENT IN POSITION, ASSISTANCE DURING AND DUTIES AFTER THE OPERATION IN PRIVATE OPERATIONS	371
XXVII. AFTER TREATMENT	376
XXVIII. ABDOMINAL OPERATIONS	384
XXIX. NURSING OF COMPLICATIONS	394
GLOSSARY	411
INDEX	417

LIST OF ILLUSTRATIONS.

Frontispiece, SECTION THROUGH THE FEMALE BODY, *facing title page*

FIG.	PAGE
1. THE PELVIS	2
2. FLOOR OF THE PELVIS	5
3. EXTERNAL GENITAL ORGANS	8
4. SAGITTAL SECTION OF THE PELVIC ORGANS	8
5. UTERUS, VAGINA, FALLOPIAN TUBE	10
6. FALLOPIAN TUBE, OVARY	10
7. URINARY ORGANS	16
8. OVULATION AND MATURATION (DIAGRAMMATIC)	23
9. SHOWING THE POSITION OF THE TOP OF THE UTERUS AT THE DIFFERENT WEEKS OF PREGNANCY	31
10. SHOWING OVUM BEFORE THE FORMATION OF THE PLACENTA	36
11. CONTENTS OF THE PREGNANT UTERUS AFTER THE TWELFTH WEEK	37
12. UTERUS CUT IN HALF SHOWING THE POSITION OF THE PLA- CENTA IN THE LOWER UTERINE SEGMENT, IN PLACENTA PRÆVIA	55
13. BODY OF WOMAN CUT IN HALF TO SHOW THE CORRECT POSITION OF THE LEFT HAND OF THE NURSE WHEN EXPRESSING THE PLACENTA	72
14. BIMANUAL COMPRESSION	76
15. BODY OF WOMAN CUT IN HALF TO SHOW THE CONDITION OF APPARENT AMENORRHŒA	91
16. POSITION OF THE UTERUS	130
17. INCARCERATION OF THE RETROVERTED GRAVID UTERUS .	133
18. METHOD OF HOLDING THE PESSARY BEFORE INSERTION .	144
19. INSERTING THE PESSARY THROUGH THE VULVAL ORIFICE .	144

FIG.	PAGE
20. CARRYING THE DISTAL PART OF THE PESSARY BACK BEHIND THE CERVIX AFTER THE PESSARY HAS BEEN INSERTED INTO THE VAGINA	145
21. THE PESSARY IN THE CORRECT POSITION, THE WOMAN STANDING UP	145
22. BACTERIA	157
23. PROTOZOA	157
24. DIAGRAM SHOWING THE PATH OF INFECTION FROM THE VULVA TO THE PERITONEAL CAVITY	180
25. DISEASED FALLOPIAN TUBE	187
26. A UTERUS, THE SEAT OF MULTIPLE FIBROIDS, CUT IN HALF TO SHOW THE DIRECTIONS IN WHICH A FIBROID MAY GROW, STARTING AS AN INTERSTITIAL FIBROID	218
27. UTERUS CUT IN HALF TO SHOW CANCER OF THE NECK OF THE UTERUS	230
28. UTERUS CUT IN HALF TO SHOW CANCER OF THE NECK OF THE UTERUS	231
29. UTERUS CUT IN HALF TO SHOW CANCER OF THE BODY OF THE UTERUS	232
30. OVARIAN CYST CUT IN HALF TO SHOW THE COMPARTMENTS IN ONE VARIETY OF CYST, THE MULTILOCULAR	238
31. AN OVARIAN CYST WITH A TWISTED PEDICLE	243
32. LEFT LATERAL POSITION	257
33. SIMS'S SEMI-PRONE POSITION	257
34. KNEE-PECTORAL POSITION	257
35. LITHOTOMY POSITION	258
36. LITHOTOMY POSITION	258
37. DORSAL POSITION	259
38. TRENDLENBURG POSITION	259
39. FOWLER'S POSITION	264
40. ARTICLES FOR WASHING OUT THE BLADDER	275
41. ARTICLES FOR INTRAVENOUS SALINE INFUSION	278

FIG.	PAGE
42. SOUTTAR'S "THERMOS" SALINE INFUSION APPARATUS	279
43. ARTICLES FOR INTRAPERITONEAL INFUSION	281
44. INSTRUMENTS FOR BLOOD TRANSFUSION	283
45. INSTRUMENTS FOR INSERTION OF RADIUM	291
46. INSTRUMENTS FOR NOVARSENOBILLON INTRAVENOUS IN- JECTION	297
47. A SURGEON'S OPERATING ROOM, 1690	310
48. A MODERN OPERATING THEATRE	311
49. MINOR OPERATING TIN OF STERILIZED DABS, DRESSINGS, AND CLOTHING	315
50. MAJOR OPERATING TIN OF STERILIZED SWABS, DRESSINGS, AND CLOTHING	317
51. NURSE PROPERLY CLOTHED FOR ASSISTING AT AN OPERA- TION	321
52. CORRECT AND INCORRECT METHODS OF THREADING THE NEEDLE WITH MATTRESS AND CONTINUOUS SUTURES	324
53. CORRECT AND INCORRECT METHODS OF FIXING A THREADED NEEDLE IN A NEEDLE-HOLDER OR PRESSURE FORCEPS	325
54. CORRECT METHOD OF HANDING THREADED NEEDLE TO THE SURGEON	326
55. TRENDLENBURG POSITION	328
56. LITHOTOMY POSITION	329
57. INSTRUMENTS FOR VAGINAL AND VULVAL CYSTS	341
58. INSTRUMENTS FOR THE RADICAL OPERATION FOR MALIG- NANT DISEASE OF THE UTERUS	343
59. INSTRUMENTS FOR ABDOMINAL HYSTERECTOMY, MYOMECE- TOMY, OVARIOTOMY, OOPHORECTOMY, SALPINGECTOMY, SALPINGOSTOMY, SALPINGO-OOPHORECTOMY, VENTRAL- SUSPENSION, SHORTENING OF THE ROUND LIGAMENTS, CÆSAREAN SECTION, APPENDICECTOMY	345
60. INSTRUMENTS FOR VAGINAL HYSTERECTOMY, COLPOTOMY	347
61. INSTRUMENTS FOR DILATATION OF THE CERVIX AND CURET- TAGE OF THE UTERUS	349

FIG.	PAGE
62. INSTRUMENTS FOR PERINEORRHAPHY, COLPORRHAPHY, TRACHELORRHAPHY, AMPUTATION OF THE CERVIX, REMOVAL OF A SUBMUCOUS FIBROID, OF A FIBROID OR MUCOUS POLYPUS	351
63. INSTRUMENTS FOR VESICO-VAGINAL AND RECTO-VAGINAL FISTULÆ	353
64. INSTRUMENTS FOR CYSTOSCOPY	355
65. DIATHERMY APPARATUS	356
66. INSTRUMENTS FOR URETHRAL CARUNCLE	358
67. INSTRUMENTS FOR OUT-PATIENT DEPARTMENT	359
68. ARRANGEMENT OF TABLES FOR MAJOR OPERATIONS	366
69. ARRANGEMENT OF TABLES FOR MINOR OPERATIONS	367
70. APPARATUS FOR GIVING A RECTAL WASH-OUT	399
71. ARRANGEMENT OF PLASTER AND TAPES	406

GYNÆCOLOGY FOR NURSES AND GYNÆCOLOGICAL NURSING.

PART I.

ANATOMY.

CHAPTER I.

STRUCTURE OF THE FEMALE PELVIS, GENITAL ORGANS, BREASTS, URINARY ORGANS, AND RECTUM.

Structure of the Pelvis.

THE female pelvis consists of four bones: the two innominate bones, the sacrum and the coccyx (Fig. 1).

The Innominate Bone.—The innominate bone is composed of three separate parts, the ilium, the ischium and the pubes, which meet at the hip joint in a hollow called the acetabulum, and which are firmly united to one another between the ages of 20 and 25 years.

The Ilium is that expanded portion of the innominate bone which forms the hip. *The Ischium* is the lowest portion of the pelvis, and that part of it upon which the body rests when in a sitting posture is called the tuberosity. The *Pubes*, with its fellow on the opposite side, forms the front of the pelvis, and their point of junction is known as the symphysis pubis.

The Sacrum.—The sacrum consists of the upper five of the lowest nine vertebræ of the spinal column, and these are fused into one solid piece of bone. The front

surface of the sacrum is curved and forms the back of the pelvis. The sacrum is perforated by eight holes through which nerves pass from the spinal cord into the pelvis, to be distributed to the pelvic contents, the legs and the feet. The prominence at the top of the sacrum, formed by the first sacral vertebra articulating with the last or fifth lumbar vertebra, is known as the promontory of the sacrum. Each side of the sacrum articulates with the corresponding innominate bone, in the region of the ilium, the joint being called the sacro-iliac joint.

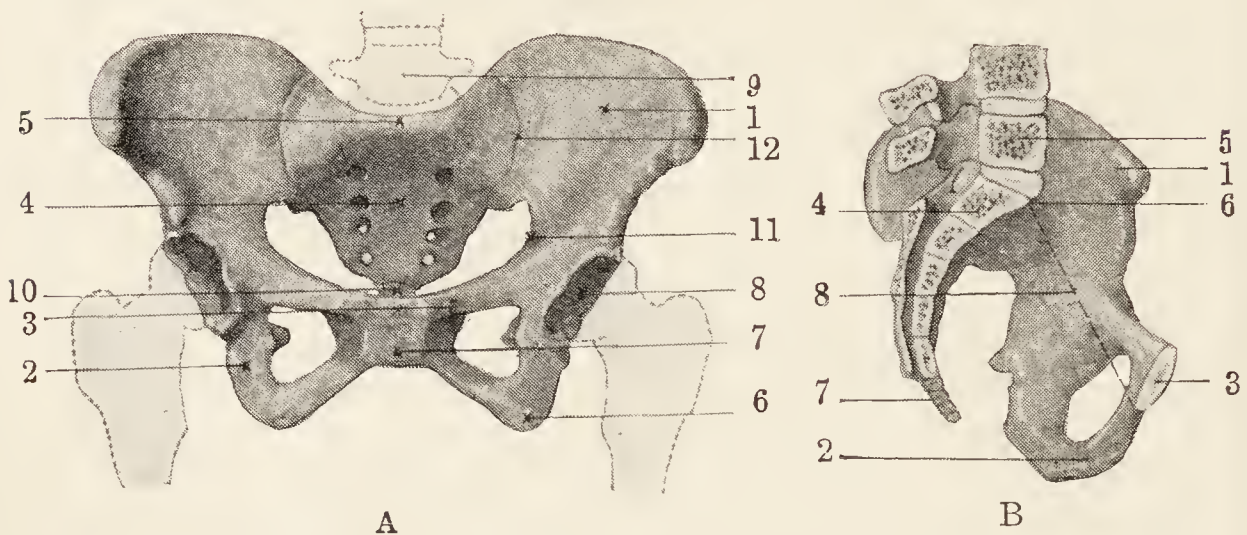


FIG. 1.

A.—The pelvis, front view. 1. Ilium ; 2. Ischium ; 3. Pubes ; 4. Sacrum ; 5. Promontory of sacrum ; 6. Tuberosity of ischium ; 7. Symphysis pubis ; 8. Acetabulum ; 9. Lumbar vertebra ; 10. Coccyx ; 11. Brim of pelvis ; 12. Sacro-iliac joint.

B.—Pelvis and fourth and fifth lumbar vertebræ divided in half. 1. Ilium ; 2. Ischium ; 3. Pubes ; 4. Sacrum ; 5. Fifth lumbar vertebra ; 6. Promontory of sacrum ; 7. Coccyx ; 8. Diagonal conjugate measurement.

The Coccyx.—The coccyx consists of the four last vertebræ in the spinal column, and these are also fused into one solid piece of bone. The coccyx forms the lowest part of the back of the pelvis and is joined to the fifth sacral vertebra by the sacro-coccygeal joint.

The Pelvis as a Whole.

The female pelvis has a special significance of its own, since through it the child has to pass before it is born. If,

therefore, the pelvis is smaller than normal, it is obvious that the progress of the child, during its birth, may be hindered or even prevented. If the dried pelvis of a female is examined, it will be found to consist of two parts which are divided by a ridge of bone known as the brim of the pelvis. The brim is formed by the upper margins of the pubic bones in front, the junction of the ilium with the ischium at the sides, and the front of the promontory of the sacrum at the back. That portion of the pelvis above the brim is known as the false pelvis, and that part below the brim is called the true pelvis.

False Pelvis.—The false pelvis has nothing to do with the mechanism of labour, and its use in midwifery is only concerned with certain measurements which can be taken from various points of its surface and which serve to indicate, in some degree, the size of the true pelvis and its shape.

True Pelvis.—From the point of view of the mechanism of labour the true pelvis is all important. Clothed with its muscles and fascia it is of such a size that the head of the child when in its proper position, namely that of flexion, can just pass through it by turning in a certain direction during its transit. There are certain measurements of the true pelvis which have a bearing on the mechanism of labour. The most important measurement is that which can be taken by a nurse from the under surface of the symphysis pubis to the promontory of the sacrum, and this is known as the *diagonal conjugate*. By subtracting $\frac{3}{4}$ of an inch from this measurement which should be $4\frac{3}{4}$ inches, the *true conjugate* diameter, taken from the tip of the sacral promontory to the back and just below the top of the symphysis pubis, can be estimated; this should be 4 inches. As the true conjugate is the smallest diameter through which the head of the child will have to pass, its importance will easily be realized. If, therefore, the diagonal conjugate is less than $4\frac{3}{4}$ inches the progress of the child will be impeded according to the amount of diminution that is present.

To allow of childbirth the normal pelvis of a woman is shallower and wider than that of a male. The arch formed by the two pubic bones is also wider, and the measurements both at the inlet of the true pelvis and at its outlet are longer. Lastly, to allow of stretching, the sacro-iliac, sacro-coccygeal and inter-pubic joints become softer during pregnancy.

The Pelvic Floor.

Just as the floor of a room supports the various articles resting upon it, so should the pelvic floor help to keep the pelvic contents in their normal position. There is this difference, however, that whereas the floor of a room is rigid and complete, the floor of the pelvis has three apertures in it to allow of defæcation, micturition, and childbirth; moreover, the tissues composing it are yielding for the same purposes. The floor of the pelvis is made up of muscles, ligaments, connective tissue, blood-vessels, lymphatics and nerves. The most important of these structures, from an obstetrical and gynæcological point of view, are the muscles known as the *levator ani* (Fig. 2). During labour, due to the fact that these muscles, with the rest of the pelvic floor, slope downwards and forwards, from the back of the pelvis to the front, and downwards and inwards from the sides of the pelvis to the middle line, the head of the child is rotated and directed forwards to the vaginal orifice. As the result of labour the levatores ani and the perineum may be torn, leaving avenues for septic infection during the early days of the puerperium, and weakening the pelvic floor, so that later on the woman may suffer from "falling of the womb."

The female genital organs may be divided into external and internal.

External Genital Organs.

The external organs of generation, which are together spoken of as the vulva, include all the structures that can be seen between the pubes and the perineum and when the labia majora are separated, as follows:—

Mons Veneris.—The mons veneris is a pad of fat in front of the pubic bones, and is after puberty covered with

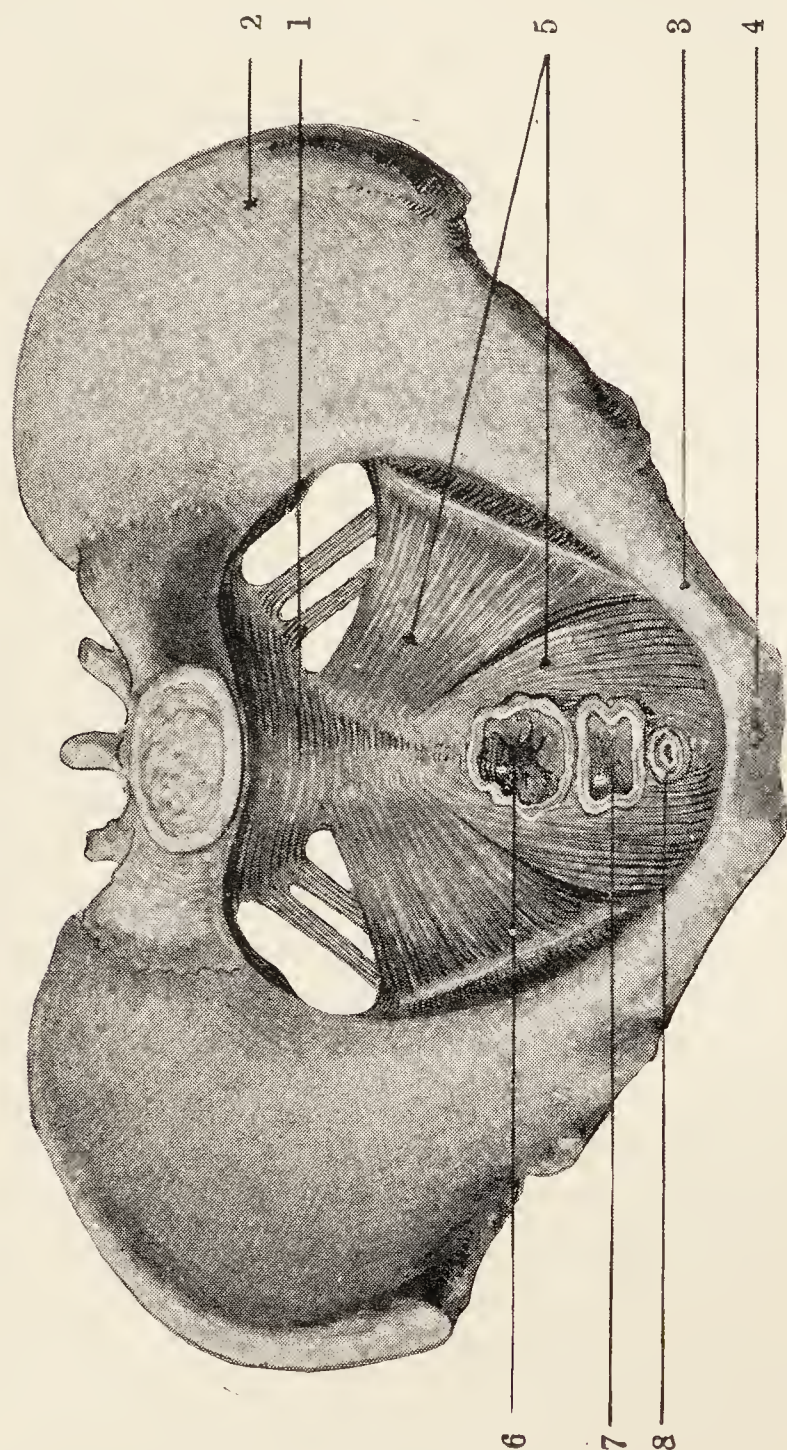


FIG. 2.

Floor of the pelvis. The uterus, Fallopian tubes, ovaries, broad ligaments, vagina, bladder, rectum; cellular tissue, blood vessels, and nerves removed. Looking down upon it from above. 1. Sacrum; 2. Ilium; 3. Pubes; 4. Symphysis pubis; 5. Levator ani muscles; 6. Rectum cut across; 7. Vagina cut across; 8. Urethra cut across.

hair. It forms the anterior border of the vulva, and should be shaved prior to an abdominal or vaginal operation.

Labia Majora.—The labia majora, which form the lateral boundaries of the vulva, are continuous in front with the

mons veneris and behind with the perineum, and are connected at their posterior extremities by a fold of skin known as the fourchette which itself forms the posterior border of the vulva. The labia are composed of skin, fat, connective tissue, unstriped muscle, blood-vessels, lymphatics and nerves. The outer surface of each labium is covered with skin and after puberty with hair, and contains many sebaceous glands. The inner surface is smooth, moist and devoid of hairs. The labia majora represent the scrotum of the male. On each side of the labia majora, situated in its posterior part, is a small gland called after the anatomist, Bartholin. The gland secretes a clear, sticky fluid which escapes by a small duct through an orifice just outside the hymen.

Labia Minora or Nymphæ.—The labia minora are situated between the upper portions of the labia majora and are entirely seen when these structures are separated. In women who have not borne children the labia minora, unless larger than normal, are hidden by the labia majora, while in women who have, they may not be. In front each labium divides into two folds, which, uniting with those of the opposite side, surround the clitoris. The two upper folds form the prepuce, and the two lower the frenum of the clitoris. Care must be taken, when preparing a patient for a vaginal operation, properly to clean the space between the under surface of the prepuce and the clitoris, as in this situation a yellowish material collects. The posterior extremities of the labia minora gradually blend with the inner surfaces of the labia majora at their lower third. They are composed of skin and contain connective tissue, a little erectile tissue in the form of unstriped muscle, blood-vessels, lymphatics and nerve endings. The nymphæ are hairless.

Clitoris.—The clitoris is situated at the apex of the vestibule and surrounded by the folds of the labia minora. It represents the penis of the male. It is composed of a small mass of erectile tissue and is covered with a very sensitive epithelium. Care should be taken, when passing a catheter, to avoid touching the clitoris.

Vestibule.—The vestibule is a smooth triangular surface situated at the anterior part of the vulva. Its apex is formed by the clitoris, its sides by the labia minora, and its base by the anterior margin of the hymen. Just above the centre of the base can be seen the urethral orifice. The nurse must always remember to swab the vestibule, with some antiseptic solution, just before passing a catheter.

Hymen.—The hymen forms the boundary between the external and internal genital organs. It is composed of connective tissue covered on each side by squamous epithelium, and is perforated in its centre. It varies in consistence, in some cases being so soft and yielding that a vaginal examination can with ease be made in virgins, in others it is so tough and resistant that, in married women, it has to be incised. In abnormal conditions the hymen may be perforated in more than one place or, and this is a serious malformation, it may not be perforated, thus leading, after puberty, to the retention of the menstrual discharge. As a result of childbirth the hymen is split, and portions of it slough, the pieces that are left being called *carunculæ myrtiformes*.

Fossa Navicularis.—That part of the vulva between the attachment of the hymen and the fourchette is known as the fossa navicularis, and it is on this surface that the primary sore of syphilis is frequently found in an infected woman.

Perineal Body.—The perineal body is a triangular structure, somewhat over an inch in length, composed of skin, connective tissue, muscle, blood-vessels and nerves. Its apex is situated at the point where the rectum and vagina first meet, and its base, covered by the skin stretching between the orifices of the vagina and anus, is called the perineum. The lower inch of the posterior wall of the vagina is closely attached to the anterior surface of the perineal body, and the lower inch of the anterior wall of the rectum to its posterior surface.

The perineal body may be torn or stretched during childbirth, and, as it forms part of the pelvic floor which helps

FIG. 3.

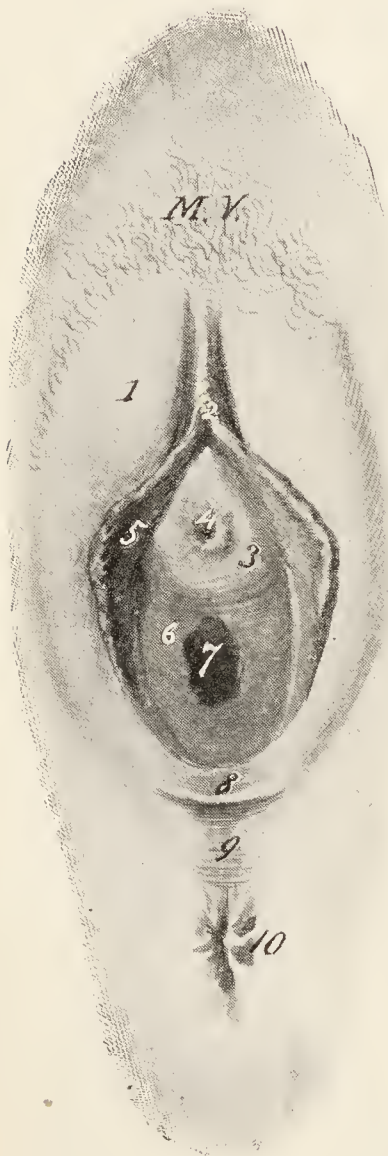


FIG. 4.

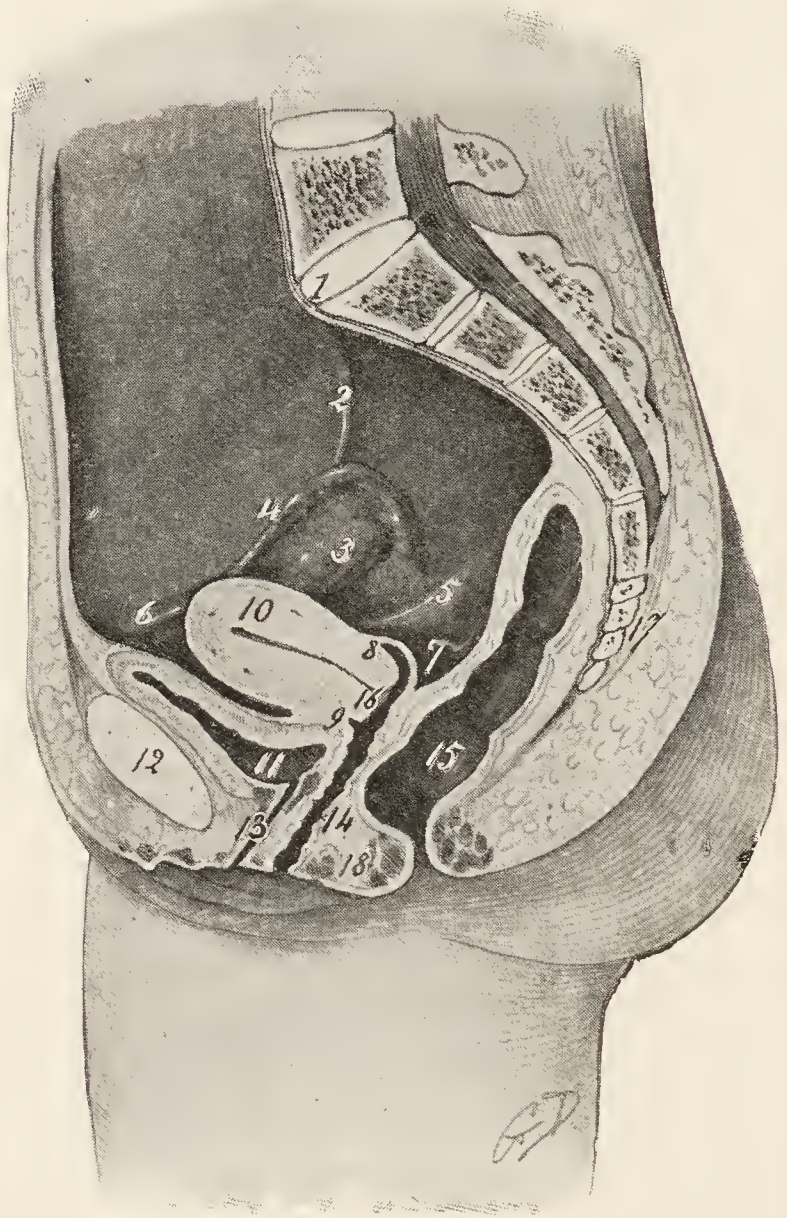


FIG. 3.—EXTERNAL GENITAL ORGANS.

- M.V. Mons veneris.
 1. Labia majora.
 2. Clitoris.
 3. Vestibule.
 4. Urethral orifice.
 5. Labia minora.

6. Hymen.
 7. Vaginal orifice.
 8. Fourchette.
 9. Perineum.
 10. Anus.

FIG. 4.—SAGITTAL SECTION OF THE PELVIC ORGANS.

1. Promontory of the sacrum.
 2. Ovario-pelvic ligament.
 3. Ovary.
 4. Fallopian tube.
 5. Utero-sacral ligament.
 6. Round ligament.
 7. Pouch of Douglas.
 8. Posterior lip of cervix.
 9. Anterior vaginal fornix.

10. Body of the uterus.
 11. Bladder.
 12. Symphysis pubis.
 13. Urethra.
 14. Vagina.
 15. Rectum.
 16. Neck of the uterus.
 17. Coccyx.
 18. Perineum.

to support the uterus, such injury favours prolapse of the uterus, or falling of the womb as it is commonly termed.

Internal Genital Organs.

The internal genital organs comprise the following structures:—

Vagina.—The vagina is, unless it is distended, a closed muscular tube, lined with membrane somewhat similar to skin and plentifully supplied with blood-vessels, lymphatics and nerves.

Starting from below, its direction is upwards and towards the back of the patient. This is an important point for the nurse to remember when passing the vaginal douche-nozzle. Starting from above, the direction is downwards and forwards. This also is an important point for the midwife, as it tells her in which direction to push the uterus from the abdomen, when she is expressing the placenta, in the third stage of labour, after it has separated and has arrived in the vagina. Ignorance of this fact has led many a midwife to conclude that the placenta was adherent, because it did not escape when she pushed downwards and backwards, i.e. in the wrong direction. The posterior wall of the vagina measures $3\frac{1}{2}$ inches, its anterior wall 1 inch less. Its relations to the structures in its neighbourhood are very important from a nursing point of view. At its lower end is situated the hymen, and projecting into its upper end is the neck of the uterus to which the vagina is attached. In front the urethra is closely united to the lower $1\frac{1}{2}$ inches of the vagina, and the base of the bladder is more loosely attached to its upper 1 inch.

Behind, the lower 1 inch of the vagina is attached to the perineal body, its upper 1 inch lies next to the lowest part of the peritoneal cavity which is known as the pouch of Douglas, and the intermediate $1\frac{1}{2}$ inches is in relation with the rectum. At the lower end of the vagina there is a thin band of voluntary muscle, known as the sphincter vaginæ. Rarely this muscle is so sensitive that when touched

FIG. 5.

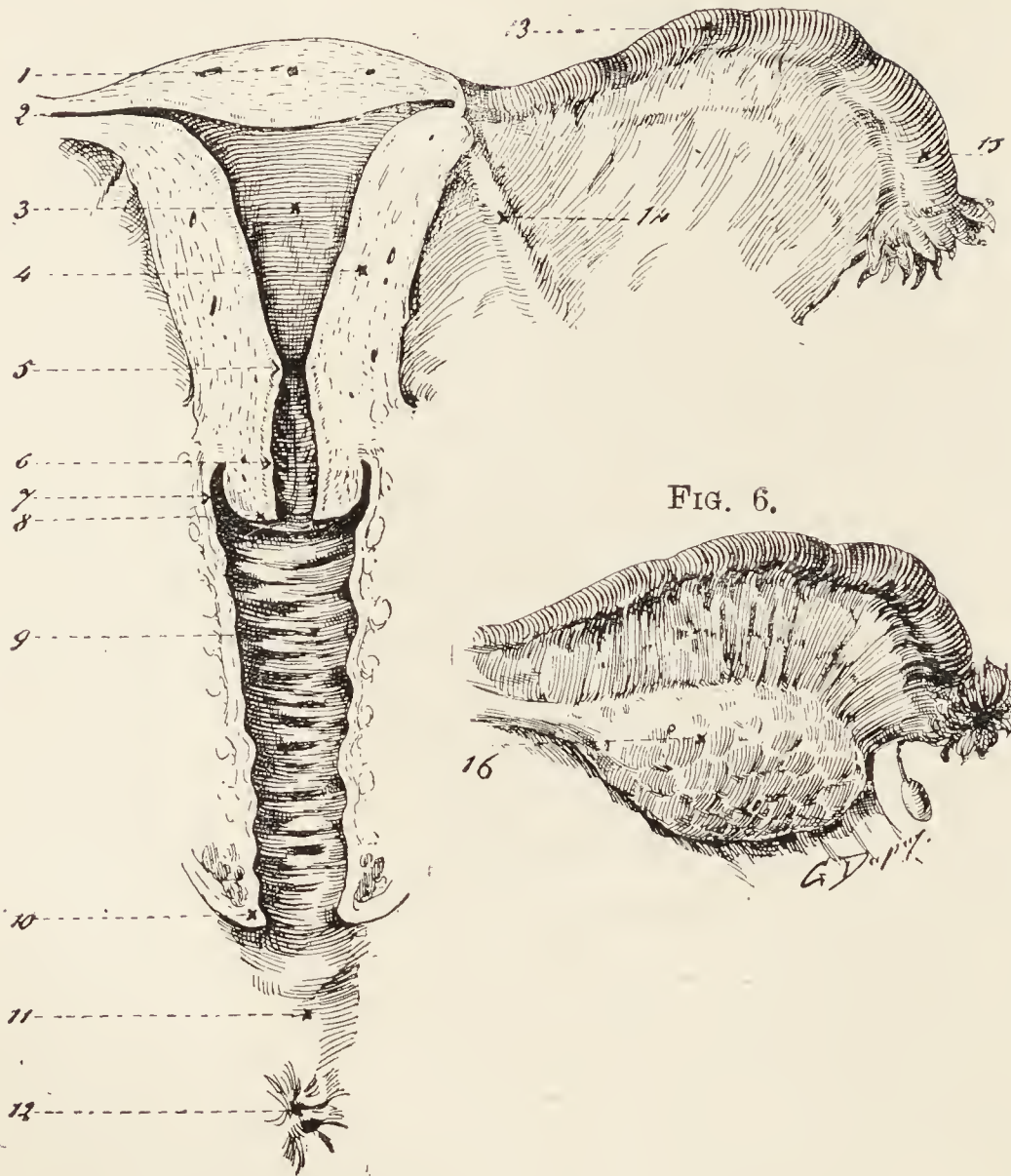


FIG. 6.



FIG. 5.—UTERUS—VAGINA—FALLOPIAN TUBE.

- | | |
|---------------------------------------|---------------------------------------|
| 1. Fundus. | 9. Vagina. |
| 2. Uterine orifice of Fallopian tube. | 10. Vulva. |
| 3. Cavity of the uterus. | 11. Perineum. |
| 4. Uterine wall. | 12. Anus. |
| 5. Internal os. | 13. Fallopian tube. |
| 6. Cervical canal. | 14. Round ligament. |
| 7. Lateral fornix. | 15. Fimbriated end of Fallopian tube. |
| 8. External os. | |

FIG. 6.—FALLOPIAN TUBE—OVARY.

16. Ovary.

it spasmodically contracts, thus preventing a vaginal examination, or as the case may be, causing pain and difficulty in coitus (dyspareunia). In the latter circumstance this band may have to be divided.

It has already been mentioned that the upper inch of the posterior wall of the vagina is in relation with the peritoneal cavity, and it is convenient to note here that a portion of the rectum, $2\frac{1}{2}$ inches from the anus, also has a similar relation. It is most important that nurses should remember these facts, because there is a danger that a douche or enema-nozzle may, by gross carelessness, be forced through the wall of the vagina or rectum and, the enema or douche-solution being injected into the peritoneal cavity, death results. This catastrophe has happened more than once. Another disaster due to gross carelessness may usefully be mentioned here, although it has no gynæcological bearing. Nurses have been known, when giving an enema, to neglect to fix the india-rubber end-piece to the bone nozzle. On occasions the end of the bone nozzle during its insertion has been forced through the rectum and the enema injected into the cellular tissue round the rectum, and as a result patients have died of cellulitis.

Uterus.—The uterus, which measures 3 inches long, 2 inches broad and $\frac{1}{2}$ inch thick, is a muscular tube covered on the outside by a shiny membrane known as peritoneum and lined internally by mucous membrane, which is continuous with the mucous membrane lining the Fallopian tubes. The uterus is supplied with blood by four large vessels known as the right and left ovarian and uterine arteries, which are accompanied by their corresponding veins (see page 33). These arteries in their course along the sides of the uterus are coiled, and thus when this organ increases in length during pregnancy, they can become uncoiled, and so lengthen with it. The smaller arteries passing into the substance of the uterus are also coiled, but these coils remain. The uterus also has a lymphatic and a complex nerve supply. The mucous membrane is termed the endometrium, and consists mostly of gland-

tissue which secretes a fluid, that from the endometrium lining the body being clear like water, and that from the endometrium lining the neck, glairy like white of egg. It may be mentioned here that when a woman becomes pregnant certain changes take place in the endometrium which is then given the name of *decidua* because, like the leaves of a deciduous tree, it is cast off (mostly) during the third stage of labour and the first few days of the puerperium, or lying-in period. The uterus is pear-shaped, and is, in order that its functions may be more properly understood, always described as consisting of two parts, the upper, called the corpus or body, and the lower, the cervix or neck.

Corpus (BODY).—The body of the uterus is the expanded portion of that organ. The uterine cavity is triangular in shape with the base uppermost, and has opening into it three canals, the two Fallopian tubes at its upper and outer angles, and the cervical canal at its lower angle. Its cavity, the walls of which are practically in contact, measures $1\frac{1}{2}$ inches in length in the virgin and in women who have borne children it is somewhat longer.

That portion of the body of the uterus about the level of the Fallopian tubes is known as the fundus.

Cervix (NECK).—The cervix lies partly in the abdominal cavity and partly in the vaginal canal. The cervical canal is 1 inch long and is cylindrical in shape. The lower end of the canal opens into the vagina through the external os, its upper end into the cavity of the uterus by the internal os.

The uterus leans forward somewhat on itself, so that while the body looks forwards the neck looks downwards and backwards, that is, the uterus normally occupies a position of anteversion (turned forwards). The uterus may also assume, in certain abnormal circumstances, other positions, such as those of anteflexion (bent forwards), retroversion (turned backwards), retroflexion (bent backwards), and prolapse (descent), and one or more of these may be combined.

Relations of the Uterus.—In front is the bladder; behind are coils of intestine in the pouch of Douglas, and the

rectum; at the sides are the broad ligaments, Fallopian tubes and ovaries; above intestine and below the vagina.

The uterus is kept in its normal position by certain ligaments, the pelvic floor, and the intra-abdominal pressure.

Ligaments. — There are ten ligaments. Four in front known as the two utero-vesical and two round ligaments which pass between the body of the uterus and bladder and abdominal wall respectively; four at the sides, the two broad ligaments and the two transverse cervical ligaments. The broad ligaments are reflected from the sides of the uterus, except the vaginal portion of the cervix, to the sacro-iliac joints. The transverse cervical ligaments pass between the spine of the ischium on each side to the cervix and upper part of the vagina. The two ligaments at the back stretch between the body of the uterus and sacrum, and are called the utero-sacral ligaments.

These ligaments, except the transverse cervical ligaments, consist of folds of peritoneum enclosing unstriped muscle and fibrous tissue. They may roughly be compared to the halyards which keep the mast of a ship in position, and if they are stretched they will facilitate a malposition of the uterus. The transverse cervical ligaments are composed of fibrous tissue.

The broad ligaments being attached to the sides of the uterus and pelvis keep the uterus in its central position. The round ligaments are attached to the uterus just by the Fallopian tubes, and the utero-sacral ligaments are attached at the level of the internal os. Thus by the aid of the former the body of the uterus is pulled forwards, and of the latter the cervix is pulled backwards, and so they help to keep the uterus anteverted; if the uterus is retroverted, therefore, its position may be rectified by an operation termed “shortening of the round ligaments.”

The uterus, however, is not rigidly fixed by these ligaments, but is able to swing backwards and forwards according to the amount of urine in the bladder. The transverse cervical ligaments prevent the uterus from slipping down.

Pelvic Floor.—The position of the uterus is also maintained by its attachment to the pelvic floor, which consists of peritoneum, fascia, certain muscles of which the levatores ani are the most important, connective tissue, blood-vessels, nerves and perineal body. This attachment may be roughly compared to the relation between the mast of a ship and its deck into which it is partly fastened. If the pelvic floor is stretched or torn, the uterus will obviously be less securely supported and will thus tend to slip down, or prolapse as it is called.

Intra-Abdominal Pressure.—The intra-abdominal pressure acts through the intestines on the back of the uterus, and so helps to keep this organ in its normal position of anteversion. If the uterus has been pushed backwards by a very full bladder (partial retroversion), and the woman suddenly strains, the intra-abdominal pressure will be applied to the front of the uterus, and forcing this organ still farther back may cause acute retroversion.

Fallopian Tubes.—The Fallopian tubes, named after the anatomist Fallopius, are two hollow structures composed mostly of muscle, lined with ciliated mucous membrane, and covered with peritoneum except on their lower surfaces, which lie between the upper layers of the broad ligament. They are supplied with blood-vessels, nerves and lymphatics, and are attached to the upper part of the uterine body, one on each side, and arch over to the corresponding ovary. Each tube is 4 inches long, and its outer part is called the ampulla, its free end being fringed or finger-like, and known as the fimbriated extremity. That portion which penetrates the wall of the uterus is called the interstitial part. It is very important to remember that since this outer end opens into the peritoneal cavity, there is, in woman, a direct channel from the vulval orifice to the peritoneal cavity, and it is by means of this channel (vagina, uterus and Fallopian tubes) that micro-organisms (septic and gonorrhœal) can reach the peritoneal cavity, setting up peritonitis, and causing perhaps death or lifelong invalidism. On the contrary, in man, there is no direct channel opening into

the peritoneal cavity. The results, therefore, of an attack of gonorrhœa, in man, are not likely to be nearly so serious, and it is very seldom directly responsible for his death, as it may be in women.

Ovaries.—The ovaries are two solid bodies $\frac{3}{4}$ inches long, 1 inch broad and $\frac{1}{2}$ inch thick, being the shape of an unshelled almond and they project into the pelvic cavity. Each ovary is supported beneath the Fallopian tube by a fold of peritoneum, and it is attached to the uterus by a small ligament and they are supplied with blood-vessels, lymphatics and nerves. The ovaries are the structures in which the ova or eggs develop and from which they are discharged. Along with the thyroid, pituitary, adrenal, thymus and pineal glands, the ovary is classified as an endocrine gland, inasmuch as its secretion, instead of passing out of the body by means of a duct, is absorbed into the blood.

This secretion, which is made in the corpus luteum (see p. 22), controls menstruation and gestation, is responsible for the development of the other sexual organs at and after puberty, “maintains the sexual organs in a state of functional activity, influences the general metabolism of the body in certain definite directions,” and depends for its perfect action on the secretion of the thyroid and pituitary glands.

When this fluid is no longer secreted, either as a result of ovarian atrophy through age, of disease, or of removal of the ovaries by operation, certain changes take place in the female which are collectively known as the menopause or “change of life,” and which will be dealt with under this heading.

The Breasts.

The essential part of each breast, when this organ is fully developed, consists of about eighteen lobules which are pyramidal in shape, their apices pointing towards the nipples. These lobules are composed of innumerable small cavities called alveoli which are lined with a secreting epithelium. In other words, the breast is a large gland which secretes a fluid special to itself, the milk. Leading from each alveolus

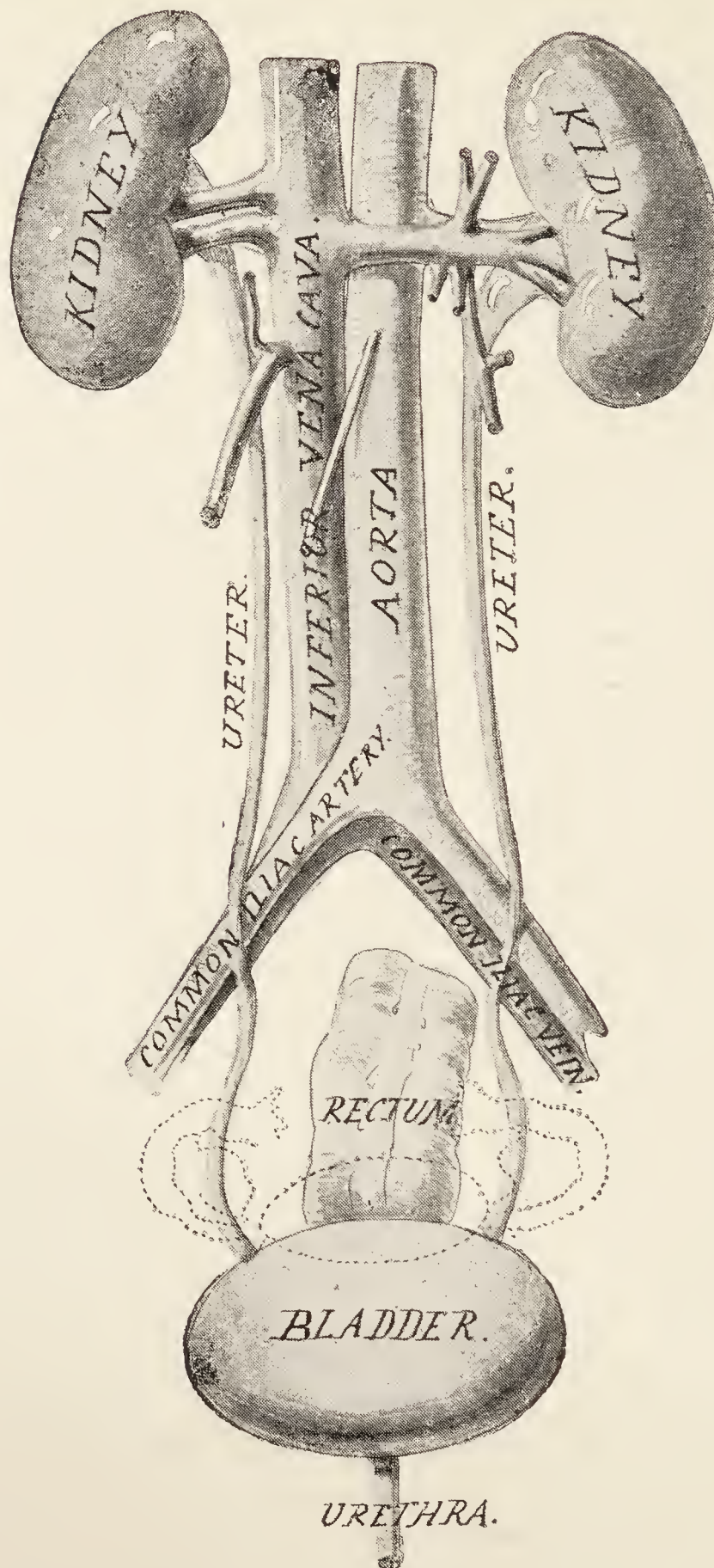


FIG. 7.—URINARY ORGANS.

The relations of the urinary organs to structures in their immediate neighbourhood. The fundus of the uterus, the ovaries, and the Fallopian tubes are dotted in, in outline.

is a small tube, and these tubes gradually join up until there remains one main tube leading from each lobule. This tube, which is called the lactiferous duct, opens on to the nipple. The nipple is covered with skin and is composed partly of muscle fibres, some of which by their contraction help to empty the lactiferous duct, while others, when the child is not sucking, act as a sphincter, and so prevent the escape of milk. These alveoli do not, as a rule, secrete unless the woman is pregnant, but rarely a secretion which is not milk can be squeezed from the breast, when the woman thinks she is pregnant but is not (pseudocyesis), or if she has an ovarian or fibroid tumour.

Urinary Organs.

Kidneys.—The kidneys are two glandular organs, situated one in each loin. Each kidney is about 4 inches long, $2\frac{1}{2}$ inches wide, 1 inch thick, and weighs 4 to 5 ounces. They are very plentifully supplied with blood-vessels, and are able, when healthy, to extract from the blood, as it passes through them, water and certain waste products which are harmful if retained in the circulation, and which together form the urine.

If the kidneys are diseased this action may be seriously hampered or even abolished, the latter complication being called *suppression* of urine.

Ureters.—The ureters are two muscular tubes 14 inches long, and are situated one on each side of the body. They connect the kidney with the bladder, conveying the urine from the kidneys to the bladder. The ureters are lined with mucous membrane and are supplied with blood-vessels, lymphatics and nerves.

Urethra.—The urethra, which is a muscular tube, $1\frac{1}{2}$ inches long, is lined with mucous membrane and is supplied with blood-vessels, lymphatics and nerves. Its lower $1\frac{1}{2}$ inches are in close contact with the anterior vaginal wall. Internally the urethra opens into the bladder, externally on to the vestibule, and it forms the canal by which the urine escapes from the bladder.

Bladder.—The bladder is a muscular organ lined with mucous membrane and is supplied with blood-vessels, lymphatics and nerves. It lies in front of the uterus, behind the pubic bones and above and in front of the upper part of the anterior vaginal wall. It forms a cistern for the urine which is being continually secreted from the kidneys, until sufficient has accumulated to induce the desire for micturition. As the urine accumulates, the bladder pushes the uterus somewhat backwards, and eventually rises out of the pelvis, forming an elastic swelling just above the symphysis pubis. In the complication known as *retention* of urine, so great may be the amount of that fluid retained that the bladder forms a well-marked abdominal swelling rising at times as high as the umbilicus. The capacity of the bladder is very considerable, and over 10 pints of urine have been drawn off in cases of prolonged retention.

It will thus be seen that there is a channel, lined with mucous membrane, leading from the vulva to the kidney *via* the urethra, bladder and ureters. The knowledge of this will indicate to the nurse how very careful she must be to swab efficiently the vulva, and especially the vestibule, and to sterilize the catheter before passing this instrument. The passage of a catheter without such precautions may lead to infection of the mucous membrane of the urethra (urethritis), of the bladder (cystitis) and of the ureter (ureteritis). Such inflammation spreading up to the kidney may be the cause of the death of the patient.

The Rectum.

The rectum is a muscular tube lined with mucous membrane. Its blood supply comprises hæmorrhoidal arteries and veins, and the latter when they become varicose form hæmorrhoids. It is also supplied with lymphatics and nerves. The rectum forms the terminal portion of the large intestine and measures, as a rule, 6 inches in length.

The last $1\frac{1}{2}$ inches, below the tip of the coccyx, are bent back, the aperture of exit being called the anus. This

orifice is kept closed by a strong sphincter muscle. In front of the lower part of the rectum is the perineal body. The middle part is in relation with the posterior wall of the vagina, and the upper part with that portion of the peritoneal cavity known as the pouch of Douglas.

The rectum acts as a temporary reservoir in which the fæces accumulate for a short time prior to their expulsion from the body. Owing, however, to careless habits the fæces are often retained in this portion of the intestinal canal far longer than they should be.

PART II.

PHYSIOLOGY.

CHAPTER II.

To understand the phenomenon of conception it is necessary briefly to describe the physiology of the female genital organs, namely, puberty, ovulation, menstruation, and the menopause.

Puberty.—Puberty marks the time when the ovaries and uterus first become active, and indicates the commencement of the child-bearing period of the female. The age at which puberty occurs varies in different races, but has nothing to do with the longitude and latitude in which the girl lives. In this country the average age is fourteen.

The importance of the influence exerted by the ovaries on the development of the female is shown by the marked change in her behaviour and temperament at puberty; she becomes quieter, retiring, and probably bashful. The external appearance also of the girl changes, so that her shape now commences to approach that of a woman, her breasts become developed, the axillæ, the mons veneris and labia majora are gradually covered with hair, the hips broaden, and the buttocks increase in size, while ovulation and menstruation commence.

It is interesting to note that at puberty enlargement of the thyroid and pituitary glands takes place, and that when the ovaries cease to act the menopause occurs.

Ovulation.—The process by which an ovum becomes ripe and is then discharged is known as ovulation. The

ovary is covered by a single layer of cells called the germ epithelium. During foetal life small processes of this germ epithelium, known as the egg-tubes of Pflüger, grow down into the substance of the ovary. These processes are, in due course, cut up by other cells of the ovary into minute portions, known as egg-nests. Certain changes take place in these egg-nests, and they become converted into *primordial follicles*. It is calculated that, when a female child is born, there are not less than 10,000 of these primordial follicles in her ovaries.

No primordial follicles are formed after the birth of the child.

The majority of these follicles remain without further development, but at, and after, puberty certain of them develop further, undergoing a transformation which is known as maturation, that is, they become ripe, and the resulting collection of cells is then known as a Graafian follicle, after von Graaf, who first described it.

Maturation.—One of the cells of the primordial follicle becomes much larger than the rest and is known as the ovum, egg cell or *oocyte*. The remaining cells arrange themselves round the larger cell and form the structure known as the *membrana granulosa*. This *membrana granulosa* proliferates, forming many layers, and then many of the cells become converted into fluid, till at last the Graafian follicle is formed, which consists of a large cavity full of fluid containing the oocyte and lined by the layers of cells.

In the final stages of maturation as the amount of fluid increases, the ovarian substance between the follicle and surface of the ovary undergoes pressure necrosis. At last the tension of the fluid in the Graafian follicle becomes so great that it bursts through the outer covering of the ovary, the fluid carrying with it the oocyte, which has become detached, and which is then grasped either by the fimbriæ of the Fallopian tube or drops into the peritoneal cavity and perishes. In the former case the oocyte is propelled along the Fallopian tube by the cilia into the uterus, from

whence it is discharged or retained according to whether or not it has been fertilized.

The oocyte having been discharged, the membrana granulosa collapses into folds. In addition the sudden relief of tension causes blood-vessels surrounding the follicle to give way. The blood coagulates, the cells of the membrana granulosa, containing a yellow pigment, grow into it, and the structure is known as the *corpus luteum*. If the oocyte is not fertilized the corpus luteum after about two weeks commences to atrophy and practically disappears a few weeks later.

If, however, the oocyte is fertilized, the corpus luteum continues to grow for twelve weeks, and then persists through pregnancy, wasting only after the birth of the child.

Ovulation occurs between puberty and the menopause, unless the woman is pregnant, when it ceases. Ovulation also, as a rule, ceases when the mother is nursing her child, but not always, and certainly not if she nurses it beyond the proper period, a custom which is not uncommon among some women and which is often pursued with the false idea that it prevents impregnation.

It is calculated that during the sexual life of a female a Graafian follicle ripens every four weeks.

Menstruation.—The period concerned with the physiological activity of the reproductive system in mammals, other than human beings, is called the *sexual season*. During this period a series of phenomena occur called *œstrous cycles* (recurring stimulations).

Each cycle is divided into four phases :—

1. A period of sexual rest (anœstrum).
2. A period of growth and functional activity of the sexual organs (pro-œstrum).
3. A period of sexual excitement (heat) when fertilization is affected (œstrum).
4. A period of pregnancy (met-œstrum).

Remarkable variations occur in different species both in the length of these four phases and in the number of

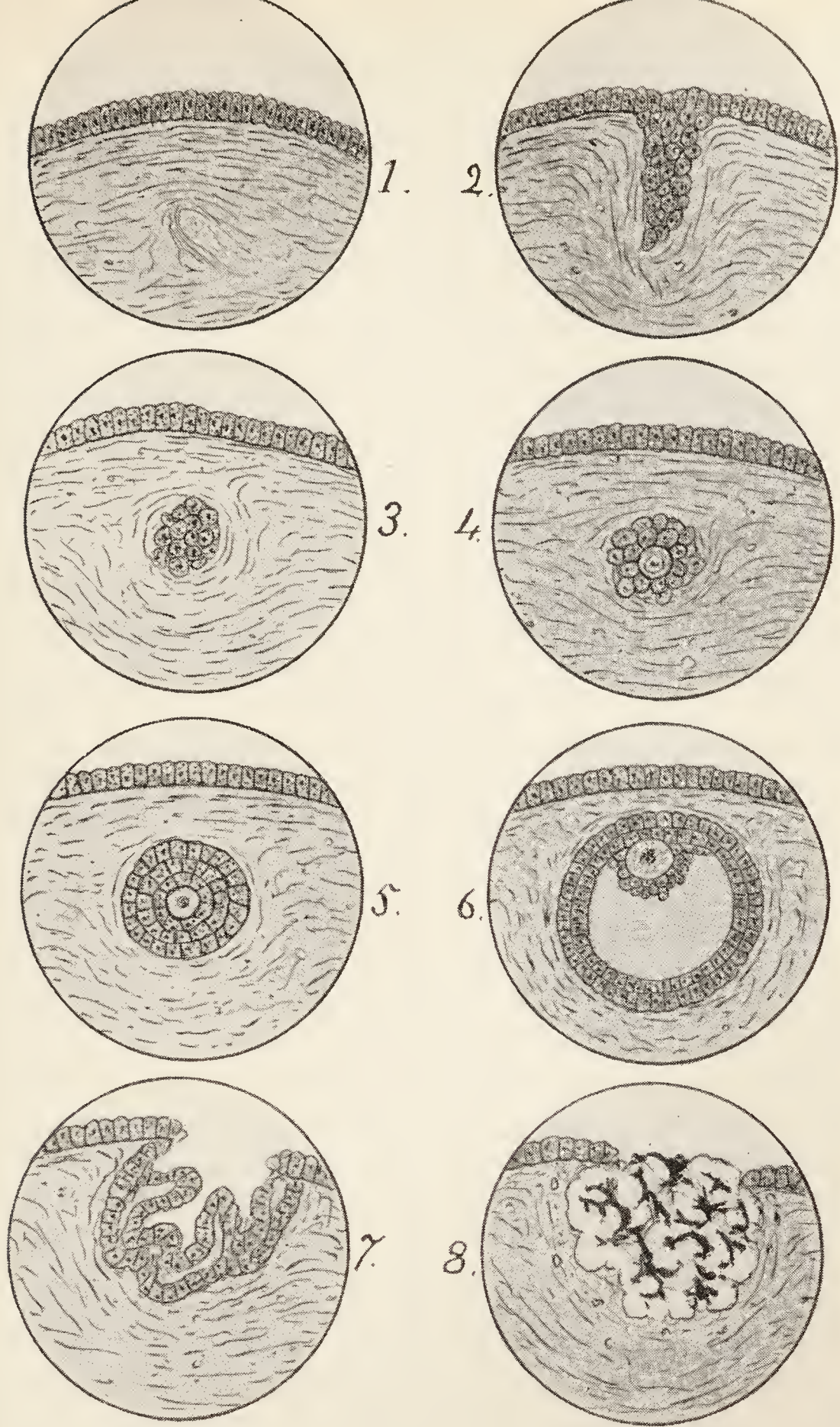


FIG. 8.—Diagrammatic representation of ovulation and maturation in a section of the ovary. 1. Germ epithelium covering the surface of the ovary. 2. Pflüger's egg-tube growing down into the ovarian substance. 3. Primordial follicle. 4. Formation of oocyte by one cell increasing in size. 5. Membrana granulosa formed round oocyte. 6. Graafian follicle, some cells of 5 being converted into fluid. 7. Collapsed membrana granulosa. 8. Corpus luteum.

œstrous cycles in each sexual season. Moreover, breeding by artificial selection and in abnormal environment introduce varieties into the sexual cycles of most mammals.

Human Female.—Attempts have been made, by some authors, to correlate the “monthly” cycles of human females with the above classification. Difficulty, however, arises from the fact that in the human female there is no specified period for the approach of the male, and moreover in the human species, apparently, two of the œstrous cycles have been “telescoped into one.” There are, however, as can be determined by microscopical examination of the endometrium four phases in the human female.

1. A *premenstrual* phase, lasting eight days, during which time the endometrium is undergoing certain changes in preparation for the reception of the fertilized ovum.

2. A *menstrual* phase, lasting five days, during which time the superficial portion of the endometrium is shed.

3. A *post-menstrual* phase, lasting six days, during which time the superficial portion of the endometrium, which has been shed, is being replaced by a new portion.

4. A *rest* phase up to the time the premenstrual phase starts again.

Menstruation, which is the outward sign of the sexual cycle in woman, is, therefore, as a fact, the miscarriage of a preceding unfertilized ovum and decidua.

The sexual cycle is governed by two secretions. The one is associated with the ripening and discharge of the ovum, and the other with the degeneration of the corpus luteum. The premenstrual phase, or as it is termed by Beckwith Whitehouse the *positive* phase, is induced by the ripening and discharge of the ovum, while the menstrual, or *negative* phase, is due to the degeneration of the corpus luteum.

During pregnancy the functions of the ovary are concerned with the embedding of the oocyte, the development of the placenta, and the growth and development of the breasts.

Menstruation is characterized by a periodic discharge of blood and mucus from the endometrium lining the body of

the uterus together with the superficial portion of this membrane. It commences with puberty and continues, normally, to the menopause.

In addition certain constitutional and other symptoms, such as depression, tiredness, headache, irritability, back-ache, tenderness of the breasts, and nausea, mark its incidence in some women. The "period," "the flow," "the courses," or "being unwell," as it is variously termed, recurs, as a rule, once a month and generally twenty-eight days from the commencement of the previous period, till the woman is between 45 to 50 years of age, except during pregnancy, and in most females during lactation. Individuals may, however, present considerable variation from this and yet be perfectly healthy; thus some healthy women menstruate regularly every three weeks, and others every five.

In most instances the flow lasts from three to six days. During this time it is not so very uncommon for the flow to cease for a day. The quantity of blood lost, which varies widely in different women, is on an average 5 ounces; but when considering whether there is an excess or otherwise in any particular patient, the amount she generally loses must be ascertained and a comparison made with that, since some women in perfect health regularly lose an amount that in others would be considered quite excessive. Since, except in exceptional instances, it is not customary to ascertain the weight of the used diapers in comparison with their weight before use, some other method has to be relied upon to ascertain whether a woman is losing more than the normal amount at her periods. As a rule it may be taken that an average woman, of cleanly habits, uses about 8 to 10 diapers during her period, but, as before mentioned, women differ in this respect and yet may be quite healthy. Any increase, therefore, in the number of diapers a woman is accustomed to use and the presence of clots, especially when a fair amount of such are expelled during micturition and defæcation, is an indication that the period is excessive.

Normally the discharge is dark red, and is not clotted

because of its mixture with mucus from the uterine glands. If, however, the loss is excessive, then it is bright red in colour, and clots may be present. Menstruation ceases if the ovaries are not functioning. Thus if the woman is pregnant, if the ovaries are totally destroyed by disease, if these organs are removed, or if the general state of the patient's health is unsatisfactory, perhaps due to some abnormal working of the ductless glands, she will not menstruate.

The fertilized ovum does not completely fill the cavity of the uterus till the end of the third month. Up to this time, therefore, there is a cavity which is lined with the decidua (the name given to the endometrium when altered by pregnancy). In some pregnant women small blood-vessels in this decidua may rupture at the time when menstruation would occur; there is, in consequence, some bleeding, and this has erroneously been termed menstruation. In such circumstances there may be a loss for the first three months, but most commonly only for the first. There being no cavity after the third month from the lining of which the blood could flow, any loss after this must be due to separation in part of the decidua (threatened miscarriage), as, in most cases, is any loss during the first three months. Miscarriage is more likely to occur when the period would have come on if the woman had not been pregnant, since there is increased congestion of the pelvic organs at this time.

There is no truth in the popular superstition that it is dangerous for a woman to take a bath during menstruation. On the contrary, it would be much better if all women did so. Excessive exercise during the period is not advisable, but unless the loss is profuse, it is a mistake for a girl or woman to allow menstruation to interfere with her ordinary activities.

The Menopause, Climacteric, or "Change of Life" takes place in the majority of women between the ages of forty-five and fifty, though it may occur earlier or later than this.

Rarely, menstruation which has been quite regular, fails to come on at the proper time, and never again appears. More commonly, menstruation is altered both in its regularity and amount: the intervals between the periods may become longer, so that several weeks or months may elapse before the appearance of the next and perhaps last period; on the other hand, the frequency may be increased, so that the periods, for a short time, come on more than once a month. The same irregularity is noticed in the amount lost. In some the quantity becomes progressively less, in others there may be one or more profuse losses, or, again, after missing several periods the woman may have a final and profuse loss.

Accompanying these changes in menstruation, certain symptoms of a well-recognized character supervene. The woman complains of hot flushes or cold sensations; nausea, sickness, dyspepsia, constipation, headache, giddiness, irritability, neuralgia, backache, or pains in various parts of the body; she may become stouter, and there is a disinclination for exercise. She may also suffer mentally so that she loses her memory, takes to drink to drown her worries, steals articles from shops, accuses her husband of no longer caring for her or of being unfaithful. The mental depression is at times so great that she talks of committing suicide and on rare occasions does so.

The menopause is a dangerous time of a woman's life, not because the cessation of menstruation accompanying it is of itself inimical to good health or is the cause of any disease, but because it is about this time that cancer of the uterus most commonly occurs. Also, since in many cases the menopause supervenes with some irregularity of menstruation, though normally it should not do so, *any increase in frequency or loss about this time is apt to be attributed by herself, friends, nurses, or even by her medical attendant to the "change of life" when in reality it may be due to cancer, the early recognition of which might have been the means of saving her life.*

It is, therefore, a safe rule to disregard the fact that at

the menopause the periods may become more frequent and profuse, without there being any discoverable cause, *and to advise any woman who is complaining of these symptoms to seek medical advice, and to insist on being examined internally.*

In certain women the menopause appears much earlier than it should. In some patients no cause for this can be determined; others will give a history of a severe illness or shock to the nervous system, and occasionally after the birth of a child the menopause supervenes.

PART III.

PREGNANCY.

CHAPTER III.

FERTILIZATION.

FERTILIZATION or conception consists in the process by which the male sex cell or *spermatozoon* joins with the female sex cell or oocyte. The male sex cells, which are developed in the testicles, are deposited in the vagina. By their own movements, aided probably by the suction of the uterus at the moment of their deposition, the spermatozoa pass through the external os, along the cervical canal, through the internal os, up the uterine cavity, and into the Fallopian tube, where one spermatozoon (and occasionally two) coming into contact with the oocyte penetrates and thus fertilizes it. Very rarely a spermatozoon will pass through the Fallopian tube into the peritoneal cavity and entering a burst Graafian follicle, before the oocyte has been discharged, fertilizes the oocyte *in situ*, giving rise to the dangerous condition known as an *ovarian pregnancy*.

It has been proved by observation that, in animals, the oocyte is fertilized in the Fallopian tube, and in most cases the same obtains in the case of the human oocyte. Certainly the not uncommon complication of *tubal gestation* is a proof that it may be. Although many women become pregnant with every opportunity, it is interesting to realize that, in reality, it must be a difficult thing for a woman to become pregnant since there is only one oocyte to be fertilized, and to ensure this Nature has ordained that tens of thousands of spermatozoa, only one of which will be required, shall be deposited in the vagina at each coitus.

The Developing Zygote.

As the fertilized oocyte (zygote) is propelled along the Fallopian tube it develops into a structure called a *blastocyst*. On reaching the cavity of the uterus this now commences to bore its way into the first portion of decidua it touches, which is somewhere in the neighbourhood of the top of the uterus. Since the placenta will eventually be formed at the site where the blastocyst is arrested, it is a wise provision of Nature that the embedding should take place in the upper segment of the uterus, otherwise, if the embedding took place in the lower segment, the placenta would be below the child and would obstruct its passage during labour. As a fact, for some reason which is unknown, the blastocyst does on occasions embed itself in the lower segment, giving rise, in due course, to a very dangerous complication of labour known as *unavoidable hæmorrhage*, due to the partial or complete separation of the placenta which is below the child, which separation must take place before the child can be born.

The Pregnant Uterus.

The physiological changes in the uterus induced by pregnancy will now be considered. Such changes are concerned with an increase in size of the uterus to enable its cavity to accommodate the growing foetus and afterbirth; changes in the endometrium to allow of the formation of the maternal portion of the placenta; hypertrophy of its muscle-coats to enable it to expel the child during labour and arrest bleeding after, and alterations in its blood supply to enable it to nourish the foetus. In addition the cervix is remarkably softened, its pink colour changes to one of purple, on listening over the uterus a blowing sound can be heard known as the uterine souffle, and painless rhythmical contractions can be felt in it from the 4th month onwards.

Increase in the size of the Uterus.—The increase in the size and weight of the uterus is due chiefly to the hypertrophy of its muscle, and a little to its increased blood

supply. The uterine cavity, during pregnancy, increases in length from $2\frac{1}{2}$ inches to 12 inches, and in weight from 2 ounces to 2 pounds after the placenta has been expelled. The position of the top of the uterus at the different months of pregnancy is shown in the following table. It

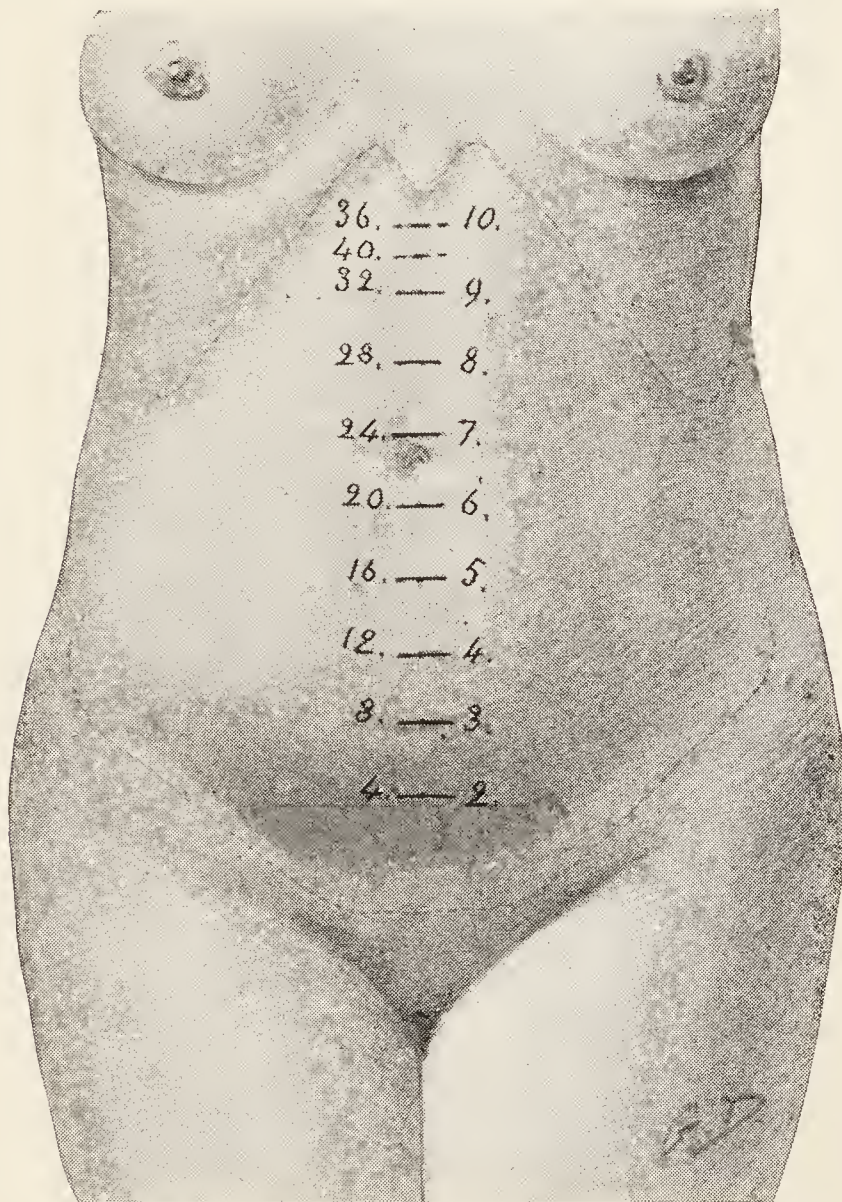


FIG. 9.—Showing the position of the top of the uterus at the different weeks of pregnancy.

will be noticed that the fundus is just below the umbilicus at 20 weeks and just above at 24 weeks. These measurements are only approximate, since they vary somewhat according to the amount of fat in the abdominal wall and whether the woman is a primigravida or multipara (Fig. 9).

At 4 weeks	} the top of the uterus is	2 in.	} above the level of the symphysis pubis.
„ 8 „		3 „	
„ 12 „		4 „	
„ 16 „		5 „	
„ 20 „		6 „	
„ 24 „		7 „	
„ 28 „		8 „	
„ 32 „		9 „	
„ 36 „		10 „	
„ 40 „		it has sunk two or three inches.	

Changes in the Endometrium.—The changes that take place in the endometrium as a result of fertilization, are of a striking character, and the resulting membrane is called the decidua, because it is almost completely cast off at and after labour. Briefly the changes are as follows. The endometrium becomes very much thickened and softer, thus forming a bed in which the blastocyst rests in the early stages of its development. In this thickened decidua three distinct layers are formed. That nearest the uterine cavity is called the compact layer, and is composed of millions of small cells closely packed together, the object of which is to prevent the ovum escaping from the decidua, especially in its early stages. The layer attached to the muscle of the uterus is called the ampullary layer and it has the same structure as the normal endometrium. It is sometimes known as the “postage stamp” layer, because the lumina at the ends of the glands being larger than the rest of the lumina represent the perforations in a sheet of postage stamps, and allow of the easy separation of the membranes and placenta at birth. The third or middle layer, which is known as the spongy layer, is that in which the intervillous spaces are formed, into which the chorionic villi of the foetus can dip, and thus extract nourishment from, and discharge waste products into, the blood of the mother.

The decidua lining the body of the uterus is variously named according to its position. Thus the portion which in time will become the maternal placenta is known as the *decidua basalis*. That which separates the ovum from the

cavity of the uterus is called the *decidua capsularis*, and the remainder of the decidua lining the cavity of the uterus is known as the *decidua vera*.

As the ovum increases in size, marked changes, as before mentioned, take place in the decidua basalis by which the maternal portion of the placenta is formed, while the decidua capsularis blending with the chorion of the foetus gradually becomes thinner, and owing to the increasing size of the ovum it eventually becomes blended with the decidua vera which itself becomes thinner. The term ovum is here used to comprise the foetus, placenta and membranes.

Hypertrophy of the Muscle Coats.—It has already been stated that most of the increase in the weight, and part of the increase in the size, of the pregnant uterus is due to the hypertrophy of the muscle coats. During the growth of the uterus, the muscle in the lower part of its body does not hypertrophy to such an extent as that in the upper part; when labour supervenes the difference in the two parts becomes marked, and they are known respectively as the upper and lower uterine segments. These segments each play a very important rôle during labour. The lower segment in extent is that portion of the uterus which at term lies within 3 inches of the internal os. The average thickness of the upper uterine segment at term is rather more than half an inch, while the lower segment is thinner. Three layers of muscles can be distinguished in the uterus after pregnancy is advanced. An outer layer which is longitudinal, the action of which is to express the child; an inner layer of interlacing fibres encircling the blood-vessels, the action of which is to prevent blood reaching the uterine sinuses after the placenta has been expelled, and a circular layer round the body and internal os, which keeps the cervical canal closed during pregnancy, assists in its dilatation at the commencement of labour and raises the intra-uterine pressure during labour.

Alterations in the Blood Supply.—The arteries enlarge with the pregnant uterus and are able to stretch because they have the shape, more or less, of the blade of a cork-

screw, the coils can thus expand as the uterus increases in length. Those branches, however, which perforate the muscle keep their coiled form and thus assist, as will be seen later, in the prevention of post-partum hæmorrhage. The veins also become enlarged, especially in the region of the placenta, where they form the *uterine sinuses*.

Lastly, the most important change is the formation of the *intervillous space* in the spongy layer of the placenta, into which the villi of the chorion can dip. The formation of the intervillous space is difficult to understand and need not here be accurately described. Running through the decidua basalis are small thin-walled arteries and veins. When the chorionic villus (concerning which see later) bores its way into the decidua basalis, its outer covering eats into some of these vessels, and so allows maternal blood to escape into the spongy layer. The intervillous space is thus formed. The maternal blood therefore in the intervillous space is continually being changed for the benefit of the foetus through the medium of the chorionic villi.

Softening of the Cervix.—This change in the consistence of the cervix is due to the œdema caused by the growing ovum pressing on the veins of the cervix. It is an important sign of pregnancy. Towards the end of pregnancy the cervix becomes so soft that it is much more difficult to distinguish than in a woman not pregnant. The softening first appears during the second month of gestation.

Blue Coloration of the Cervix.—This alteration in colour appears at 12 weeks and is due to the venous congestion.

Uterine Souffle.—The uterine souffle is a blowing sound heard over the sides of the pregnant uterus. It is, as a rule, heard best over the left side and is thought to be due to the blood rushing through the uterine artery. In frequency it corresponds to the rate of the pulse of the mother.

Uterine Contractions.—Throughout pregnancy painless contractions are taking place in the uterus. These rhythmical contractions can easily be appreciated by placing the hand on the uterus. At the 16th week the uterus can be

felt quite easily through the abdominal wall, and it is at this time, therefore, that intermittent uterine contractions are first noticed. The intervals between the contractions vary, and may be as long as 20 minutes.

The Ovum.

No one as yet has had the opportunity of examining the earliest stages of the development in the human zygote. There is no reason to think that these differ from that which takes place in the case of other mammals. On this assumption, therefore, we may take it that when the spermatozoon penetrates the human oocyte they both fuse and the zygote is thus formed, consisting of one cell $\frac{1}{100}$ of an inch in diameter. This cell at once divides into two, then into four, then into eight and so on, with the result that very quickly the zygote has been replaced by a mass of cells which are numbered by the million. The further development of the zygote is most difficult to understand and impossible adequately to describe in a book of this nature, neither for that matter is there any necessity.

Suffice it to say that some of these form a membrane known as the *chorion* from which spring minute finger-like processes called *chorionic villi*; others form a membrane known as the *amnion*, and the remainder form the embryo.

Chorion and Chorionic Villi.

When the developing zygote (blastocyst) reaches the uterus it is already rough from innumerable shaggy projections known as the primitive chorionic villi. It is by means of these primitive villi that the blastocyst is able to bore its way into the decidua, and, having come to rest, to absorb nourishment from the mother till the perfect villi are formed.

When the developing ovum comes to rest in the decidua the chorionic villi at its upper pole grow and branch very extravagantly, while the primitive villi covering the rest

of the ovum atrophy and disappear, the chorionic membrane only being left. That portion of the decidua to which the villi are attached is called the decidua basalis, and from it the maternal portion of the placenta is formed, the remainder covering the ovum over the site of the atrophied villi is known as the decidua capsularis.

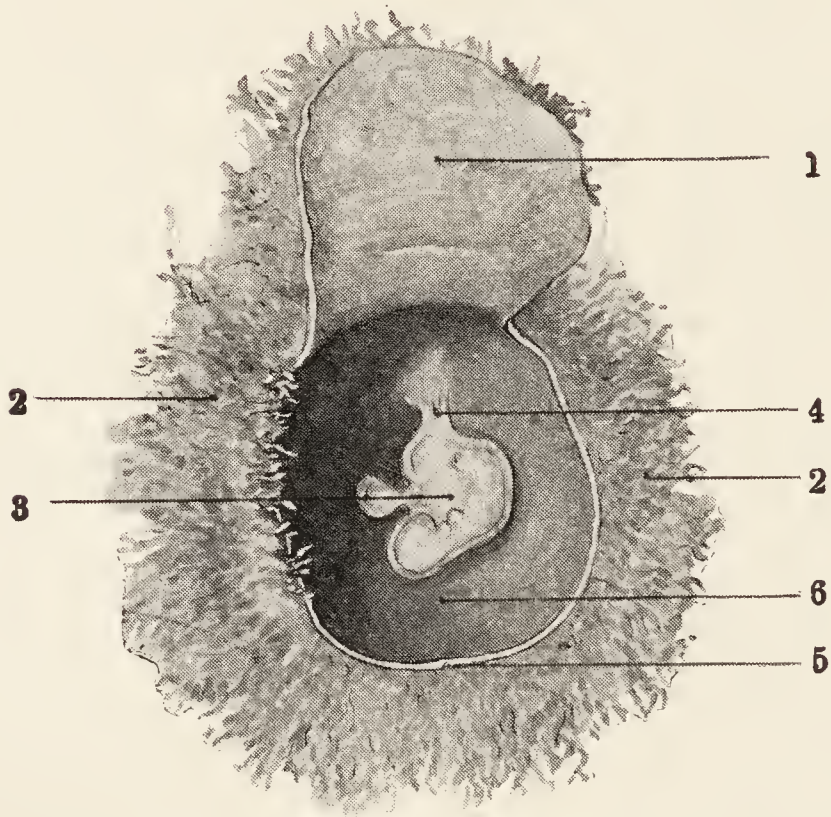


FIG. 10.—The ovum before the formation of the placenta. It has been cut open and the flap raised so as to show the interior. 1. Flap raised; 2. Chorionic villi; 3. Embryo; 4. Umbilical cord; 5. Amnion; 6. Liquor amnii.

Amnion.

Some of the cells taking part in the formation of amnion, liquefy. The water thus formed is called the liquor amnii, and the liquor amnii separates the foetus from the amnion, except at one spot, so that it is contained in a little water bag. The wall of this water bag is thus composed of the chorion and amnion, and these two structures form the membranes of the foetus. The chorion is outside and from it is formed the foetal portion of the placenta. The amnion is inside and the amniotic fluid is to protect the foetus from

blows and jars and to give it room in which to develop and exercise. During labour, as will be seen, portions of the amnion and chorion dilate the cervical canal.

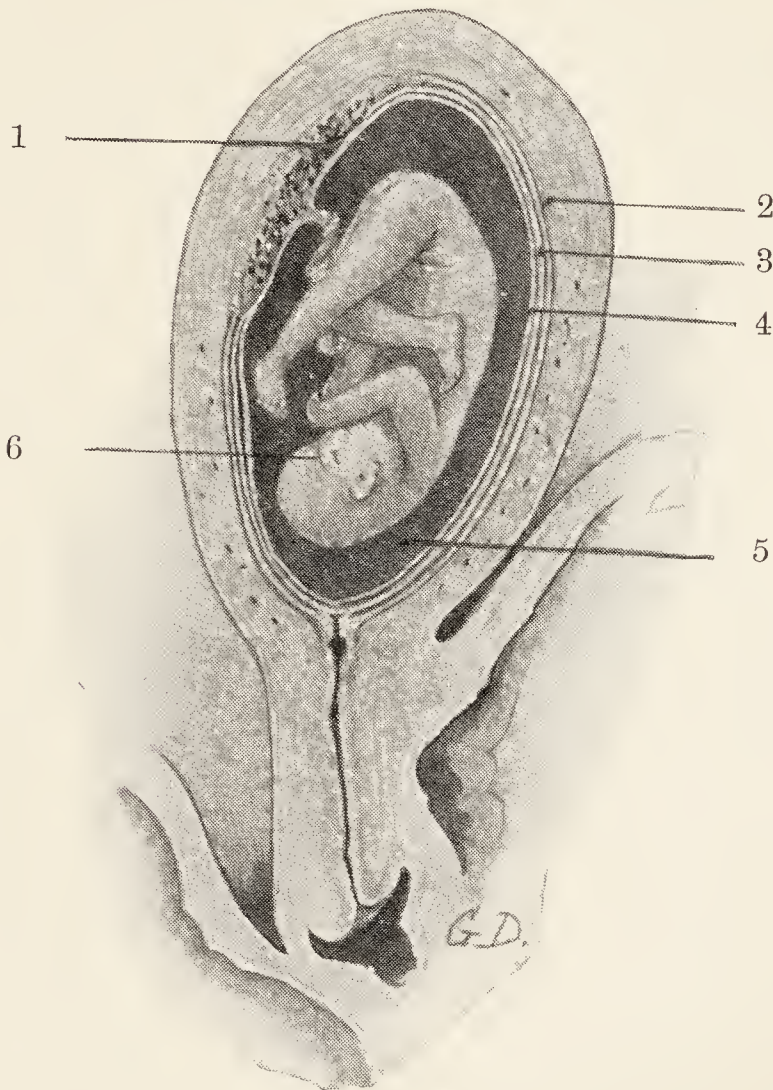


FIG. 11.—Contents of the pregnant uterus after the twelfth week. 1. Placenta; 2. Decidua; 3. Chorion; 4. Amnion; 5. Liquor amnii; 6. Fœtus. The three membranes are purposely shown in the diagram: they are, as a fact, united to one another. As the fœtus grows, the decidua become compressed, so that at term very little of it remains, what there is appearing as patches of reddish shreds.

Embryo.

Floating in this bag of water is the embryo, which is fashioned out of the remaining number of cells. The embryo, however, is not floating free, but is attached by a stalk to that portion of the chorion from which the villi are growing and which is the fœtal portion of the placenta.

Into this stalk two arteries and one vein, known as the umbilical arteries and vein, grow from the foetus and the stalk is now known as the *umbilical cord*. These arteries and vein having grown as far as the villi, divide into innumerable branches, one arterial branch and one venous branch growing up into each villus. Most of the chorionic villi are composed on the outside of a thin layer of cells containing very minute and thin-walled blood-vessels. These villi, as already mentioned, dip into the intervillous space, and it therefore comes about that the foetal blood in the vessels of the villi is only separated from the maternal blood in the intervillous space by the thinnest of tissue.

It only remains to describe how the foetal portion of the placenta is attached to the maternal portion ; in other words, why the weight of the embryo pulling on the chorionic villi does not drag the latter out of the intervillous space. Just as a house is held together by steel girders so are the maternal and foetal portions of the placenta held together by certain of the chorionic villi—differing in structure from the others—which stretch between the decidua basalis and the chorion, and do not nourish the foetus.

The Foetal, Villous and Placental Circulation.—Before birth the kind of blood circulating in the vessels of the umbilical cord is reversed, inasmuch as the arterial blood is flowing into the foetus through the umbilical vein and the venous blood is flowing out of the foetus through the umbilical arteries, and the same obtains in the circulation of the chorionic villi. The blood flowing from the veins of the chorionic villi into the umbilical vein has been purified by the arterial blood in the intervillous space into which, it will be remembered, small arteries open. The oxygen of the maternal blood soaks through the thin outer covering of the villi into their veins. Together with this oxygen, water, salts, proteids, fats and sugar also soak through, and all of them are carried along the umbilical vein to the foetus where they are used in the process of its growth. As a result of this growth waste products are formed such as carbonic acid, certain salts, and other substances. These

waste products are absorbed into the blood of the foetus which in its turn is pumped by the foetal heart into the umbilical arteries and thus into the arteries of the chorionic villi. On their arrival in the blood of these arteries the waste products soak through the outer covering of the chorionic villi into the intervillous space to be carried thence by the sinuses into the circulation of the mother, whence they are got rid of through the medium of her lungs, kidneys, digestive tract and skin. From this it will be seen how, till the child is born, the placenta takes the place of the lungs, kidneys and digestive organs of the foetus.

Growth of the Foetus.—That the growth of the foetus is extremely rapid is evidenced from the fact that in 40 weeks it grows from a single cell about $\frac{1}{100}$ of an inch in diameter and, even if one could be obtained, too light to be weighed, to a child measuring in length 20 inches and weighing on an average 7 pounds. The weight is not nearly such a good indication of the intra-uterine age of the foetus as its length, as it varies in some cases strikingly both above and below 7 pounds. The length, however, is more or less constant. The intra-uterine age of a child at and after 20 weeks can be nearly accurately calculated by halving its length thus—at 20 weeks it is 10 inches long, 30 weeks it is 15 inches long and 40 weeks it is 20 inches long. As a rule males are somewhat heavier than females, and the weight of the child tends to increase with successive pregnancies.

CHAPTER IV.

Antenatal Conditions.

The Care of the Pregnant Woman.—Pregnancy being a physiological condition there is no need to alter the mode of living, supposing it to be a healthy one, of a woman who becomes pregnant. Nevertheless, the ideas women have of what is really a normal method of living vary so enormously that it is all for the good of a woman, and especially when she is pregnant for the first time, that she should be given certain information which will redound to her well-being. Moreover, as nurses are often called upon to give advice in such circumstances, the following may be of use :—

Dress.—It is unwise for a pregnant mother to catch cold, and therefore, if she can be persuaded to do so, she should wear woollen underclothing. There are various parts of the body which some women are apt to compress, namely, their waists, breasts and legs. The modern fashion of wearing corsets, somewhat low and not reaching to the breasts, and of wearing suspenders instead of garters, obviate these discomforts mostly, but fashions change, and every woman does not follow them, either from choice or necessity. Although the breasts, especially in some cases towards the end of pregnancy, would be better for a support, it is most important that the nipples should not be pressed upon, in view of the fact that they require to be as perfectly formed as possible for the future suckling of the child. Tightly to compress the waist interferes with the natural growth of the uterus and perhaps the movements of the foetus. Moreover, as the heart, lungs, liver

and kidneys have additional and very important work to do during pregnancy it is not wise to hamper their action by the means of a tight corset. Garters compress the veins of the leg, and in a pregnant woman tend to make the veins varicose, or increase their varicosity if this is already present.

The abdominal wall in a woman who has had one or more children may become very stretched and loose. In such circumstances as the uterus enlarges it may fall forward and cause a good deal of discomfort. This can be remedied by the patient wearing a nicely fitting abdominal belt.

Diet.—A pregnant woman usually eats more food than when she is not pregnant, it is therefore desirable that it should be as digestible as possible. Moreover, the greater the quantity of food taken, the larger will be the amount of waste products which will have to be excreted, and this in spite of the fact that a careful selection is made of the diet. If, in addition, the woman partakes of food, the digestion of which will result in the elaboration, when compared with plain articles of food, of an additional amount of waste products, her excretory organs are unduly taxed. Now there are certain very serious diseases of pregnancy, which, even if they do not owe their origin to the waste products of the woman, are certainly more likely to supervene if her excretory organs are unduly taxed. Red meat, therefore, should be taken only once a day, and all highly seasoned articles of diet should be prohibited. The woman should be encouraged to drink plenty of water so as to increase the action of her kidneys, by which means some of the waste products may be got rid of the more easily. Alcohol is best avoided.

Baths.—Certain waste products are excreted by the sweat glands of the skin. That these waste products are deadly is proved by the fact that if a rabbit is varnished it dies, which also was the end of a little boy who took the part of a Cupid in a tableau at a celebrated ball in Paris. To make his appearance more striking he was covered with

gold leaf, but unfortunately he died in convulsions. Dirt occludes the mouths of the duct of the sweat glands. It is obvious, therefore, how important it is that a pregnant woman, as others, should have a warm bath daily, using plenty of soap in the process, special attention being paid to the nipples and vulva. Probably it is better to take the bath before going to bed.

Nipples.—It is of the greatest importance, both to the mother and the child, that the latter should be fed by the breast; unfortunately many women, sooner than forego pleasure by giving up their social functions for a few months, refuse to nurse their children. Others, while willing and wishful to nurse their children, are unable to do so, either because their nipples are retracted or sore. For the child to suck properly the nipples should project well beyond the breast. This may be encouraged by the woman drawing the nipples out and massaging them with her fingers every day and by avoiding the pressure of corsets. Nipples that have not been treated properly during pregnancy, or after labour, are more likely to get sore. The woman should wash them every morning with soap and water, at the same time scrubbing them lightly with a brush to remove any dried secretion and shed portions of skin.

Morning Sickness.—The majority of women for the first time pregnant complain of a troublesome nausea, occurring in the morning and lasting from the second to the fourth month. Some of them suffer from vomiting. Such a condition is best treated by the woman staying in bed somewhat longer than usual and taking a glass of milk and a biscuit, or a slice of bread and butter, the first thing in the morning. There are varieties of vomiting which affect the pregnant woman (see pp. 49, 50), and which may threaten her life. If therefore the nausea and vomiting is more than trifling, or lasts longer than usual, it is desirable that a doctor should be consulted.

Regulation of the Bowels.—The danger of an accumulation of waste products in the circulation of a pregnant woman has already been insisted upon. That a large

amount of waste products are normally excreted through the alimentary canal is evident from the fact that a patient who is suffering from unrelieved intestinal obstruction dies as a result of their poisoning. A pregnant woman especially, therefore, should be certain that she has a daily evacuation of the bowels. As strong purgatives, in some cases, tend to cause miscarriage their use should be avoided. Plenty of fruit will suffice to ensure a proper action of the bowels in many women, others will require some mild aperient such as cascara sagrada, liquorice, senna pods or saline.

Hæmorrhoids are not very uncommon during pregnancy, and if present may be the source of great pain and worry. A daily action of the bowels is imperative, after which the parts should be washed with a sponge and water and then with cold boric lotion. If the hæmorrhoids are prolapsed they must be replaced.

Mouth.—The mouth and teeth should be attended to daily. The organisms in a dirty (septic) mouth are carried by the food into the stomach and intestines and may interfere very considerably with good digestion, and being absorbed may even give rise to a septic condition. Moreover, the teeth of a pregnant woman are apt to decay more easily than one who is not pregnant, and if necessary the woman should certainly seek the advice of a dental practitioner.

Exercise.—Seeing that a pregnant woman has to supply the food for the growth of her unborn child as well as excrete the large amount of waste products that are formed by its extremely rapid growth, it is obvious that her digestive and excretory organs will be severely taxed. She should therefore lead a quiet healthy life, having plenty of fresh air and walking exercise daily, short of fatigue, by which means she will be enabled to throw off the waste products more easily. Dancing, cycling, golfing, hunting, driving a motor, the use of the sewing machine, and in fact any hard work should be avoided, and absolutely prohibited if she has previously had a miscarriage.

Antenatal Examination.

It may truly be said that the future of a nation is wrapped up in antenatal care. It is the experience of all medical men in charge of maternity beds that the percentage of serious complications of pregnancy and labour has notably decreased since antenatal clinics were established at their hospitals. Unfortunately every woman cannot go to a hospital for antenatal advice, and many of those who are able will not do so. This loss of antenatal care in the hospital clinic has now been met by the establishment of antenatal centres in most towns of any size in the United Kingdom, to which any pregnant woman who applies is cordially welcomed. It should be the object of every nurse, therefore, who has the opportunity, to persuade pregnant women, not under the direct supervision of a medical practitioner, to attend an antenatal centre. It is taken for granted that a medical man will send his patients to such a centre or otherwise will examine them himself at stated intervals.

At the antenatal centres the urine of the pregnant woman is examined repeatedly, so that if toxæmia is supervening albumin, which is a warning sign, can be detected and the toxæmia in most cases arrested. Her pelvis is measured, and the relation of the size of the head of the child to that of the pelvis of its mother is noted so that difficulty in labour is obviated. The lie of the child is determined and if necessary rectified, again anticipating a difficult labour. Advice is given on the lines indicated on page 40 under "Care of the Pregnant Woman" and also as to the preparation of the room and accessories for labour, and minor ailments are treated.

CHAPTER V.

Toxæmia of Pregnancy.

TOXÆMIA during pregnancy may declare itself in various forms, the chief of which are the pregnancy kidney, eclampsia, pernicious vomiting, and pernicious jaundice. The latter two are very rare. All these serious conditions have a similar origin, namely, the absorption of some poison or poisons which, acting in different ways and picking out more particularly different organs, give rise to the various complications noted above. Whether the poison is derived from the mother or from the foetus is not finally settled, although the balance of opinion inclines to that of a foetal origin. Nevertheless, even if it is granted that the poison causing the particular disease is entirely foetal in origin, the condition of the mother must claim a large part in the supervention of toxæmia, since, taking into account the number of pregnant women, this toxæmia is rare, and it has never been suggested that the foetal tissues in some cases excrete this poison and others do not. The toxæmia is therefore intimately associated with the pregnancy on the woman's side. It has already been pointed out that not only does a pregnant woman make more poisons (waste products) on her own account that she has to get rid of, but she has to eliminate in addition waste products made by the very quickly growing foetus. The poisons circulating in the blood of a pregnant woman have to be rendered harmless by certain processes in the liver, and expelled from the body through the channels of the kidneys, intestines and skin, in the medium of expired air, bile, urine, fæces and sweat. The organs concerned in these antedotal measures, acting

normally, are enabled to get rid of these poisons and the woman is kept in health. If, however, these organs are the seat of disease, or are overtaxed, they are not able to do their work so efficiently and the individual is more or less poisoned. Now although the function of the liver and kidneys, as of other organs, is augmented during pregnancy, there is no doubt that the border line between their physiological and pathological action is a slender one. When a woman becomes pregnant all her organs are unduly taxed and in some cases overtaxed. Women differ in their resistance to poisons resulting from pregnancy as they do in resistance to diseases when they are not pregnant, and just as a non-pregnant woman will easily acquire some complaint to which another is immune, so one pregnant woman can deal with the poison excreted by the foetal tissues, as well as the additional amount of waste products, while others fall a victim thereto. The digestive and excretory organs in some women cannot stand this extra amount of work and so are damaged and are thereby unable entirely to eradicate the poison, so that instead of it all being rendered innocuous and expelled some of it remains circulating in the blood. In the same way some women are able to withstand the foetal poison and eliminate it, whereas in others the foetal poison has a pathological effect on the liver and kidneys, and even if these organs are not actually injured by the poison, the fact that they are overtaxed by the waste products prevents their eliminating it as they should, the result being that the foetal poison also is circulating in the mother's blood. With this short discussion of the subject, the various forms of toxæmia will briefly be noted.

The Pregnancy Kidney.—This complaint is much more common in women pregnant for the first time (primigravidæ) than in women who have had children (multiparæ). It generally appears in the latter half of pregnancy. The severity of the disease varies, for whereas in some women it is only first discovered by finding albumin in the urine during the routine examination, others complain of headache, defective eyesight, swelling

of the eyelids, hands, feet, and vulva, sickness, indigestion, all or any of these. The amount of albumin varies from a very little to a great deal, while the quantity of urine may be diminished. When the disease is discovered and treated in its early stages the patient, as a rule, quickly gets better. More rarely the woman is left with her kidneys permanently damaged.

TREATMENT.—

The patient is kept in bed and her diet is arranged so that as little proteid as possible is taken. Proteid is split up by the digestive organs into a nourishing and a poisonous portion. The poison, if the digestive organs are healthy, is rendered innocuous and then expelled. The wisdom therefore of reducing the amount of proteid when the digestive organs are not acting normally, is obvious. In severe cases the diet consists mainly of milk. In the less severe cases fish, eggs, milk puddings, bread and butter and tea or cocoa are allowed. A careful chemical examination is made of the urine every day and the bowels are kept well open. If in spite of treatment the condition does not improve, the pregnancy is terminated.

NURSING.—

The nurse must measure and chart the amount of urine passed daily. She should also put up a specimen every day for the doctor to examine if he wishes to. She should ensure that the patient drinks plenty of water and is kept warm.

Eclampsia.—If the toxæmia in the pregnancy kidney is of an acute type, there is danger of eclampsia developing. Eclampsia, which is one of the most dangerous complications of pregnancy, is a condition in which the woman suffers from fits, and it occurs twice as often in primigravidæ as in multiparæ. The mortality is 22·1 per cent. in the mothers and at least 40 per cent. in the children, death taking place during or after the fits. The fits may appear without any warning if the urine has not previously been examined. The presence in the urine of a large quantity of albumin, a diminished quantity of urea, perhaps blood,

and a marked diminution in its quantity are signs of very serious import.

Apart from the findings in the urine, the warning signs include a severe and constant headache, epigastric pain and perhaps vomiting, œdema especially in the vulva and upper part of the body and serious interference with vision, in some cases even temporary blindness.

The fits, which are very characteristic, have three stages. First a *premonitory stage* in which there are twitchings of the head and face. This is succeeded almost at once by the *tonic stage*; the patient becomes rigid from contraction of her muscles. The diaphragm and chest muscles being fixed, air is unable to enter the lungs and the patient becomes cyanosed. The jaws spasmodically contracting may trap the tongue which is thus bitten. In about half a minute the third or *clonic stage* supervenes which lasts up to two minutes, and in which the muscles are alternately contracted and relaxed. The movements of the lower jaw churn the saliva into a froth and the patient foams at the mouth, the foam being coloured if there is bleeding. The breathing is stertorous, the patient is unconscious and at the end of a fit passes into a *coma*.

The state of coma may soon pass off, or the patient may die without regaining consciousness, or the coma may last some time when, on regaining consciousness, the patient does not remember anything that has happened.

TREATMENT.—

The treatment is first concerned with the fit itself and afterwards with the prevention of its recurrence.

During the fit steps must be taken to prevent the patient from hurting herself and from being suffocated. The patient, therefore, should not be moved during the fit. A pillow should be placed under her head and her clothes should be loosened. A gag, made by wrapping a handkerchief or a piece of towel round the handle of a spoon or piece of wood, should be placed between the teeth to prevent the tongue being bitten. The head should be turned to one side so that the saliva runs out of the mouth instead of into

the lungs, otherwise the patient may be suffocated or get broncho-pneumonia.

The steps taken by the doctor to prevent the recurrence of the fits, include keeping the patient in bed and the administration of various drugs such as morphia, veratrone, chloral hydrate and potassium bromide. In addition he will endeavour to dilute the poison and eliminate it through the kidneys by ordering large quantities of water to be drunk, and through the bowels by giving purgatives which cause watery evacuations. Rectal salines, or, if the patient is unconscious, subcutaneous or intravenous saline infusions, hot baths, hot packs or hot-air baths to get the skin to act may also be ordered. In addition he may deem it necessary to bleed the patient, and to deliver her with the forceps as soon as it is safe to do so. As regards food nothing is given except water.

If the doctor has warning he will treat the patient on the lines indicated under the treatment of the pregnancy kidney and will probably induce labour forthwith.

Pernicious Vomiting.—This disease, otherwise known as hyperemesis gravidarum, is a rare complication in the latter months of pregnancy and is, as a rule, fatal. It is mentioned here chiefly because it is apt to be confused with another variety of vomiting known as NEUROTIC VOMITING, which occurs, as a rule, during the first half of pregnancy. A pregnant woman suffering from neurotic vomiting may be very ill and indeed die if proper care be not taken.

DIAGNOSIS.—

In either case the patient may vomit anything that she takes into her stomach, she will get emaciated, her breath will be very offensive and her pulse-rate will be raised. The urine of a patient suffering from toxæmic vomiting will contain albumin, the vomit may contain blood, the patient is very likely jaundiced, and the disease runs an acute course. On the other hand, neurotic vomiting runs a chronic course, there is no albumin in the urine or blood in the vomit and the patient is not jaundiced.

TREATMENT.—

The only chance the woman has, if suffering from pernicious vomiting, is for the pregnancy to be terminated. Nearly every case of neurotic vomiting, however, can be cured without such a procedure, if properly treated.

NURSING.—

Neurotic Vomiting.—The successful treatment of a patient suffering from neurotic vomiting will depend largely on the efforts of her nurse. If only the patient can be persuaded that she is going to get quite well, and is protected from fussy and anxious relatives, and her mind is kept off the idea of vomiting by removing all such incentives as basins, towels and macintoshes from her bed, she will recover in two or three days or less. It is better not to give these patients liquid food. The nurse should be kind but firm, insist on the patient swallowing solid food and standing over her while she does so. Patients suffering from neurotic vomiting can be cured at once by being sent into a hospital or nursing home and treated on the lines indicated above.

Pernicious Jaundice.—This rare and most serious complication, otherwise known as acute yellow atrophy of the liver, generally occurs in the latter months of pregnancy, or even does not supervene until after the child is born. The patient nearly always dies. The prominent symptoms are acute abdominal pain, severe headache, vomiting and diarrhoea, jaundice and drowsiness passing into coma. The skin of the patient, her vomit and urine are markedly jaundiced and the latter contains albumin and often blood.

TREATMENT.—

The patient is treated on the lines already indicated under the pregnancy kidney; and if the woman is still pregnant, the uterus is emptied.

Miscarriage.

The term abortion is better kept for the criminal termination of a pregnancy. In the first few weeks the whole ovum

will most likely come away and certain dangers are obviated thereby since from the formation of the placenta to the 28th week, when the child is viable, the placenta, because the "postage stamp" layer is not yet properly formed, is apt to be retained and cause trouble from hæmorrhage or sepsis. It is for this reason that abortionists do not care about applying their illegal trade after the third month. From the 28th week onwards the "postage stamp" layer is in process of being perfected, and the nearer the gestation approaches term the more easily will the placenta be separated naturally.

Miscarriage is most common in the first three months and it occurs at least once in every five pregnancies.

CAUSE.—

If the ovum dies the woman must miscarry. The ovum can be killed by depriving it of its proper blood supply, as when a portion of it is separated by some jar or injury; by some disease of the mother such as kidney disease or syphilis; by the mother being poisoned, most commonly by lead; by a backward displacement of the uterus so that this organ cannot rise into the abdomen and there is therefore no room for the uterus to expand; by certain diseases of the placenta or membranes; by conditions or drugs which make the uterus contract, such as fright, exertion, or ergot; by strong purges and so on. Some women, however, in the absence of any known cause miscarry easily and repeatedly, and this unfortunate complication is known as the *habit of abortion*. On the other hand, some women may use every endeavour by violent exercise, or by poisoning themselves with drugs or purgatives, to produce a miscarriage and fail. There is no drug known which will certainly cause a miscarriage, neither is there any method, other than that of rupturing the membranes, or dilating the cervix and removing the ovum.

SYMPTOMS.—

The chief symptoms of miscarriage are bleeding due to the partial or complete separation of the ovum and abdominal

pain due to the contractions of the uterus. The fact that a woman bleeds during the first three months of pregnancy is no proof that a portion of the ovum has separated, although in most cases this is so, and certainly it is after the third month. The ovum, however, is not large enough entirely to fill the cavity of the uterus till the third month, and until it does there is a cavity of varying size lined by decidua, and bleeding may, though it rarely does, take place from this membrane.

SIGNS.—

The chief sign of a miscarriage is that of bleeding, and in some cases the ovum can be felt projecting through the dilating cervix. In a septic miscarriage the patient will have high fever and a very offensive discharge.

VARIETIES.—

Miscarriage is said to be either *threatened* or *inevitable*. Threatened if a small portion only of the ovum is separated, and if it has not already been killed by some disease or drug, the pregnancy may, with proper treatment, continue to term and a healthy child be born. When, however, the bleeding is severe, indicating that a large portion of the ovum has separated, or when the abdominal pain is very acute, showing that the contractions of the uterus will surely separate the ovum, the miscarriage will certainly take place. There are two forms of inevitable miscarriage, *complete* when all the ovum comes away, and *incomplete* when a portion of it is retained.

RESULTS.—

Miscarriage is such an apparently harmless and easy complication in some women that they are unaware of its occurrence, or realizing their condition ignore it and continue their usual vocation. Rarely the amount of blood lost places their lives in jeopardy. The common danger is that of sepsis, which may lead to a fatal termination, but more frequently to a septic condition of the uterus and Fallopian tubes. Septic miscarriage, therefore, is a frequent

cause of sterility and is the commonest cause of diseased Fallopian tubes and ovaries—conditions leading to much misery and invalidism, and in many cases to very dangerous operations which may result in death. The fact that a woman has had one miscarriage makes her more liable to have another.

TREATMENT.—

Threatened Miscarriage.—The patient must be kept strictly in bed, not being allowed to get out for defæcation or micturition, and that for at least a week after the last sign of blood has disappeared. She should be kept absolutely quiet, free from all disturbing influences such as visitors, noise, newspapers, and letters. The bowels should be kept acting with mild aperients and the diet should be of a simple variety. All highly seasoned articles of food and alcohol should be strictly forbidden. In addition the doctor will examine the patient with a view to ascertaining and treating the cause if possible, and in addition he will give her some preparation of opium.

Inevitable Miscarriage.—If the abortion is not septic or the bleeding is not excessive, inevitable abortion is properly treated by allowing Nature to terminate the pregnancy. If, however, sepsis is present or the life of the woman is in danger from bleeding, the doctor will empty the uterus.

NURSING.—

The nurse will strictly carry out the doctor's orders. In cases of threatened miscarriage she will follow the treatment detailed above as far as she may be able. In addition the nurse must not give the patient any food before the doctor has seen her in case he decides to empty the uterus, for which purpose an anæsthetic will be required. The nurse must also save a specimen of the urine and everything that the patient passes from the vagina, this latter duty being most important as the doctor will wish to know whether the ovum has been expelled, and if so, whether all of it has been expelled. If the doctor decides to empty the uterus, the nurse will have to prepare the patient and her

surroundings just as for any other operation. If the patient is bleeding very badly and the doctor has not arrived, the nurse should give an antiseptic douche at a temperature of 118° F. with the object of making the uterus contract down on to that part of the ovum which has separated and so plug the mouths of the bleeding vessels. If she has any fermergin or pituitary extract the nurse should give a dose with a similar object. If these measures are not sufficient and the nurse is capable of doing so she should plug the vagina. See p. 270.

If after the miscarriage the patient is suffering from shock, the nurse will have to carry out the treatment ordered by the doctor.

ANTE-PARTUM HÆMORRHAGE.

Accidental Hæmorrhage. Unavoidable Hæmorrhage.

Although this condition is not included in the Syllabus of the General Nursing Council a few words concerning it will not be out of place. Ante-partum hæmorrhage is bleeding due to the separation of the whole or part of the placenta, from the time the child is viable, i.e. the 28th week to term. There are two varieties, one in which the placenta is situated on the upper segment, known as accidental hæmorrhage, and the other in which the placenta, or part of it, is situated on the lower uterine segment, known as unavoidable hæmorrhage, or placenta prævia.

CAUSE.—

Accidental hæmorrhage is not so named because the placenta has been separated by accident, though in rare cases a severe blow or fall may cause such a separation. Cases of accidental hæmorrhage can be divided into two groups—a toxæmic group and a non-toxæmic. The toxæmic cases are by far the most serious.

Unavoidable hæmorrhage is very properly so called since as the placenta, or part of it, is situated over the lower uterine segment, a portion of it, at any rate, must become separated when this lower segment commences to dilate

before labour, or is fully dilated during labour. The placenta being inelastic is unable to remain attached to the lower uterine segment as this is stretched, and so becomes detached (Fig. 12).

Any condition which is likely to make the attachment of the placenta less firm than normal can be the cause of

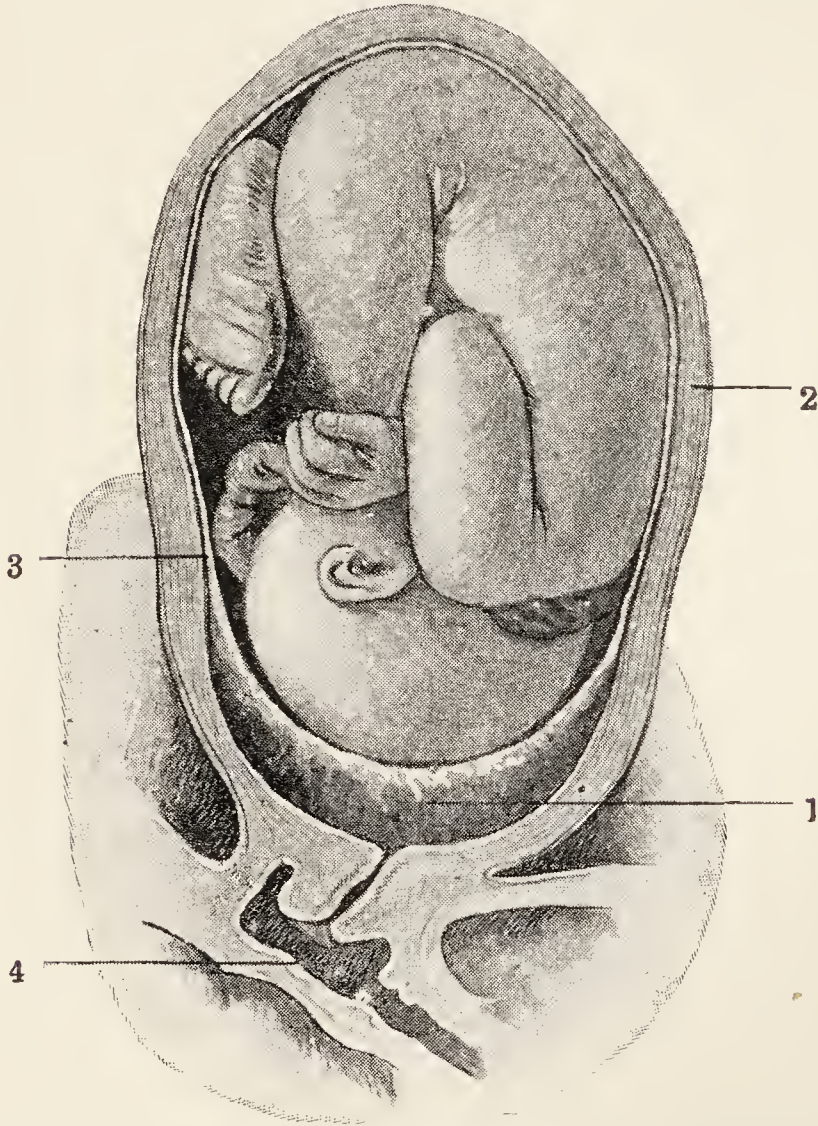


FIG. 12.—Uterus cut in half showing the position of the placenta in the lower uterine segment, in placenta prævia. 1. Placenta prævia; 2. Wall of uterus; 3. Membranes; 4. Vagina.

accidental hæmorrhage, so that disease of the decidua (maternal portion of the placenta) is responsible in many cases, and for this reason it is more common in multiparæ who are, for one reason or another, more likely to have suffered from some infection of the endometrium. Accidental hæmorrhage also occurs in women who are

suffering from some serious constitutional disease leading to rupture of blood-vessels at the placental site and bleeding into the placenta. The most modern theory of its origin is that it is due to the toxæmia of pregnancy, and it is a significant fact in the majority of cases albumin is found in the urine.

Why the ovum, in cases of unavoidable hæmorrhage, should become embedded in the decidua covering the lower uterine segment, so that the placenta is below the foetus instead of above, it is not known.

VARIETIES.—*Accidental hæmorrhage* is either *revealed*, in which case the blood escaping from the open uterine sinuses tracks down between the chorion and the decidua, and escapes by the vagina, or *concealed*, in which case the blood is held up, for some reason, in the uterus and distends it, no blood escaping externally; this is a very dangerous variety. There is a third form, really a combination of the two already mentioned, in which most of the blood is held up in the uterus, and a little, principally serum, escapes externally. This is a most dangerous variety in that the fact that there is internal bleeding may escape notice and the external bleeding is so slight that but little attention may be paid to it.

In *unavoidable hæmorrhage* by its situation the placenta may entirely cover the os when it is called complete placenta prævia, partly cover the os when it is called partial placenta prævia, or not cover the os when it is called marginal.

SYMPTOMS.—

In *revealed accidental hæmorrhage* the patient complains of bleeding. She may give a history of a fall, blow, or some unusual exertion. In *concealed accidental hæmorrhage* the patient will probably be very ill from toxæmia and will complain of very great abdominal pain due to the stretching of the uterus by the retained blood; the other symptoms will be those of hæmorrhage. In *unavoidable hæmorrhage* the symptoms are those of bleeding, and the history of the bleeding may help; the bleeding may

start when the patient is sitting in a chair working or when asleep.

SIGNS.—The signs of *accidental hæmorrhage* are those of bleeding, and in the concealed variety, as no blood can be seen to be escaping, the signs are found to be those of internal bleeding. There is very often albumin in the urine and œdema of the legs, an indication of the toxæmia. In addition, in the concealed or combined variety the uterus is tender and feels as hard as a board. In *unavoidable hæmorrhage*, if the nurse is skilled in maternity work, she may be able to identify the placenta by passing a finger through the cervical canal and feeling it.

TREATMENT.—

In cases of *revealed hæmorrhage*, if the bleeding is slight, the doctor may treat the patient on the lines indicated under threatened miscarriage. If the bleeding is severe and labour has not started, he will probably apply a binder, rupture the membranes and plug the vagina. If labour has started and the cervix is fully dilated, the doctor will deliver with the forceps; if the cervix is well dilated, he will probably apply a binder, rupture the membranes and inject pituitary extract.

Concealed accidental hæmorrhage is very dangerous because of the shock and internal bleeding, and the uterus may not retract after the child is delivered by the vagina so that post-partum hæmorrhage may ensue. The doctor will apply an abdominal binder, plug the vagina and treat the shock with warmth and morphia. If the patient improves he will puncture the membranes. If the patient gets worse he will have to perform Cæsarean section or even hysterectomy if the uterus does not retract. It is a very desperate condition and nearly half the women die.

In cases of *unavoidable hæmorrhage* the doctor will deliver the child by inserting a De Ribes's bag, by the forceps, by turning or by Cæsarean section, according to which variety of placenta prævia the woman is suffering from, to the amount of dilatation of the cervix and to the judgment of the particular doctor.

NURSING.—

Till the doctor arrives the only thing the nurse can do if the bleeding is severe, is to put a tight binder on the patient, give a hot douche, and plug the vagina. If the bleeding is very severe the nurse may also give a dose of fermergin. It is advisable to delay doing so as long as possible since the doctor on his arrival may wish to turn the child, and if the drug causes the uterus to contract strongly this may be impossible or dangerous. The nurse must have the douche apparatus and hot water ready for treating post-partum hæmorrhage should it occur. If the patient has lost much blood before the birth of the child, then a fatal result from post-partum hæmorrhage may follow a loss so small that if it occurred after a normal first and second stage it would attract but very little notice.

PART IV.

PARTURITION.

CHAPTER VI.

STAGES OF LABOUR. POST-PARTUM HÆMORRHAGE.

PARTURITION, which starts with the dilatation of the cervix and ends normally with the expulsion of the placenta and membranes, is divided into three stages, the first, second and third; and concerned in the mechanism of labour are four factors, the uterus, the placenta and membranes, the auxiliary muscles, and the child.

The mechanism of a perfectly normal labour only will be dealt with here, and that only in a summarized manner. For a detailed account of labour and its efficient management the nurse may refer to the author's *Handbook of Midwifery for Midwives and Obstetric Dressers*.¹

Date of the Onset of Labour.—No one can predict with certainty the time labour will commence, and it is not known what starts the process. The nearest date one can fix upon is 280 days or 40 weeks from the first day of the last menstrual period, as this is found to be correct in the average number of cases. The reason why an exact calculation cannot be made is because it is impossible to tell when the spermatozoon fertilized the oocyte. It might be thought that in cases in which a single coitus had taken place it would be easy to calculate the date of the labour, but since it is known that spermatozoa will remain alive in the genital canal for 10 days at least, after a single coitus

¹ Cassells & Co., 7th Edition.

there would be a doubtful period of 10 days. In the vast majority of cases a single date cannot be obtained, and whether the oocyte became fertilized just after the last menstrual period, or any time between this and the date of the next period must always remain uncertain. It is known that the most likely time for a woman to become pregnant is the first three or four days following the cessation of the period, and so the calculation is made from the first day of the last period. On occasions, further difficulties may arise in "giving a date" because a woman may become pregnant during a period of amenorrhoea (absence of menstruation) due to her nursing her last child, or to some constitutional condition, and therefore, in the latter event, if the calculation was made from the last menstruation it might be quite wrong. Again, a woman may have a monthly discharge of blood for the first one, two or three months of pregnancy, and a calculation made in such circumstances would lead to a mistake. Very rarely a girl has been known to become pregnant before she has ever menstruated. Doctors, therefore, do not rely entirely on the method of counting 280 days from the commencement of the last period, but, and especially in any doubtful case, check such a calculation with the appearance of certain events in pregnancy, such as morning sickness, which normally commences at the sixth week and ends the sixteenth, intermittent uterine contractions at the eighteenth week, quickening at the sixteenth week, foetal movements and foetal heart sounds at the twenty-fourth week, and the height of the top of the uterus, which, for example, is a little above the umbilicus at the twenty-fourth week.

There are no certain indications that labour is shortly to commence, but during the last two weeks or so of pregnancy the head of the child, as a rule, sinks down a little, with the result that the diaphragm is not so incommoded and the woman breathes more easily; this is known as "lightening," and is accompanied by an increase in the frequency of micturition due to the head pressing more on the bladder,

and at times by cramp in the legs, swelling in the legs and very painful hæmorrhoids.

The First Stage of Labour.

From the commencement of labour till the os is fully dilated.

The Uterus.—Labour commences by a relaxation of the cervix and lower uterine segment; this in itself starts a painful contraction of the body of the uterus, the contractions before having been painless. Up till the relaxation of the cervix the pressure of the painless contractions of the uterus is the same in all directions, but the dilatation of the cervix leaves the lower pole of the ovum unsupported, and therefore the pressure on the amniotic fluid in contact with that portion of the membranes which is unsupported forces down the latter and commences to separate them from the lower uterine segment and causes them to bulge a little through the external os. This separation is also assisted by the longitudinal muscles pulling up and stretching the cervix and lower uterine segment. As the membranes separate small blood-vessels between the chorion and decidua are torn, and any blood escaping trickles down through the os and washes out the plug of mucous that has filled the cervical canal during pregnancy. This discharge is known as the “show”.

False labour pains must be distinguished from *true* labour pains. False labour pains are felt in the abdomen, are irregular, colicky and intestinal in origin. True labour pains are felt in the back, are regular, gradual and uterine in origin. They are accompanied by the “show,” and the uterus can be felt to harden with the pain.

A marked change also takes place in the action of the muscles of the uterus, so that instead of retaining their former length on relaxation after a contraction, as they did during pregnancy, they remain a little thicker, or in other words, the relaxation is deficient so that a permanent shortening of the muscle fibres results. *Retraction*, as this is termed, is a very important attribute of the uterus' action

in labour and is most marked in the second and third stages. Moreover, retraction only occurs in the upper uterine segment, the lower segment never getting thicker during labour but always progressively thinner. Retraction then commences in the first stage of labour, its action is not marked and is concerned with dilating the cervix.

The Placenta and Membranes.—The pains during labour are rhythmical, and become stronger and more frequent as it progresses until they reach the maximum as the head is being expelled. In the intervals of the pains the uterine muscle relaxes, except that portion which is retracted. This relaxation enables the mother to obtain temporary rest and also allows the circulation in the placenta, which was stopped during the contraction, to continue.

It has already been pointed out that when the chorion separates from the decidua a bag of membranes is formed by the liquor amnii under pressure forcing the chorion and amnion through the external os. A fluid wedge is thus formed, the object of which is to dilate the external os and what remains of the cervical canal, which in a primigravida at the commencement of labour is well marked. The nerve relations between the cervix and lower uterine segment and the upper segment of the uterus are such that the stretching of the former incites the latter to contract. The first stage of labour proceeds therefore with stretching of the external os and lower segment followed by contraction of the upper segment, and so on until the external os is fully dilated, i.e. to a diameter of $3\frac{1}{2}$ inches, when the pressure on the bag of membranes by the liquor amnii is sufficient to tear the amnion and chorion and the membranes are thus ruptured.

Early Rupture of the Membranes.—From what has been said, it is evident that if the membranes rupture before the full dilatation of the external os labour will be prolonged, because the blunt head of the child will not fit into the external os so well as the fluid wedge of membranes, therefore the cervix will not be easily stretched and consequently contraction of the upper segment will not be so efficient, a condition known as “*sluggish uterus*”. Moreover, the labour will

also be prolonged because the internal os will not be so quickly dilated. This is bad for the mother, as she will not get so much rest, and also for the child as the placental circulation will be more interfered with. The normal duration of labour in the first stage is about eighteen hours in a primipara and nine hours in a multipara.

The Auxiliary Muscles.—These muscles are not brought into action during the first stage of labour; their action will be described under the second stage.

The Child.—The child is in a position of flexion, the vertebral column being flexed, the head bent on the chest, the arms folded across the chest, the thighs bent on the abdomen and the legs on the thighs. It does not make any appreciable progress during the first stage.

The Second Stage of Labour.

From full dilatation of the external os to the expulsion of the child.

The Uterus.—Retraction of the upper segment of the uterus now commences in earnest, and plays the chief part in the expulsion of the child. As the upper uterine segment becomes thicker its cavity becomes smaller, with the result that the amount of room available for the child gradually decreases, and it is thus squeezed into the lower uterine segment and vagina. Moreover, retraction prevents the child being pushed back by the contraction of the vagina and pelvic floor when the uterus relaxes. Lastly, as the retraction becomes more marked additional power is gained from the increased thickness of the upper uterine segment.

The intra-uterine pressure has now another action. Whereas in the first stage of labour the pressure is exerted on the amniotic sac only, and this is known as the *general intra-uterine pressure*, on rupture of the membranes a certain amount of liquor amnii escapes which allows the uterus to contract directly on to the upper part of the child, and this is known as the *direct uterine pressure*. This latter pressure is the chief agent in expelling the child, acting, as it does, along the spine of the child on to its head. The

general intra-uterine pressure, however, has still an important mission, its action now being to keep the child in the best direction for expulsion, that is in the axis of the genital canal.

The Placenta and Membranes.—As long as there is a sufficient amount of liquor retained in the uterus above the head of the child, during the second stage of labour, the circulation through the placenta is not injuriously interfered with. In the absence of relaxation of the uterus, due to a dangerous condition known as *tonic* contraction, which may occur in the second stage if labour is obstructed, the mother becomes much exhausted and the child is in great danger of being asphyxiated through interference with the placental circulation. In normal labour the head being driven down into the vagina acts, up to a point, especially during a pain, as a cork in a bottle, and the small amount of liquor amnii that escapes does so very slowly. The membranes are separated a little during the second stage of labour, being thrown into ridges by the retraction of the upper segment and stretching of the lower segment.

Late Rupture of the Membranes.—Rarely the membranes do not rupture at the end of the first stage. Labour is then prolonged because the direct uterine force is not able to act properly. When, therefore, the os is fully dilated, the correct treatment is to rupture the membranes if they remain whole. Moreover, the amnion, which is the tougher, in cases of late rupture may burst through the chorion with the result that a portion of the chorion may be retained after the third stage of labour. More rarely the child is born before the amnion is torn, in which case the child is said to be born with a caul. In olden days sailors were particularly partial to cauls, regarding them as mascots, and these would fetch as much as £5.

The Auxiliary Muscles.—As the pains become stronger and more frequent during the second stage, and the vagina and vulva are stretched by the advancing head and by the contraction of the uterus, certain muscles of the skeleton automatically contract; the woman having fixed her pelvis

by pressing her feet against the bottom of the bed, and her shoulders by pulling on a towel tied to the end of the bed, the muscles which are attached to the shoulders and pelvis are able by their contraction to cause greater expansion of the chest and so a deeper inspiration can be taken. This deep inspiration having been taken the woman holds her breath, and the diaphragm thus completely depressed forms a firm surface against which the top of the uterus can rest and so get a greater effect when it contracts; just as one can push away a heavier weight with one's back against a wall than if one is standing in the middle of the room without any such support. Further, by contracting her abdominal muscles, "bearing down" as it is termed, the woman is able to raise the intra-abdominal pressure very considerably, which itself, acting on the uterus, is an additional factor of some magnitude in expelling the child. It is true that labour can go on in the absence of such auxiliary aid, but it is also true that labour is lengthened in those cases in which the woman cannot use her auxiliary muscles, as when, owing to disease of the heart or lungs, she is not able to hold her breath.

The Child.—After the membranes have ruptured, that portion of the head of the child which is lowermost, projecting through the os or more or less free in the vagina, is not subjected to any pressure, with the result that serum escapes from the capillaries in that portion of the scalp between the skin and covering of the bone (pericranium), and a soft swelling is formed which is the first part of the child touched on vaginal examination. This swelling is known as the *caput succedaneum*.

There is no necessity here to enter into any details concerning the movements of the head of the child during its progress through the birth canal. Suffice it to say that with the head keeping well flexed the occiput rotates forwards till it is facing the symphysis pubis and then slips under the pubic arch, after which the head extends and is born, followed directly by the birth of the arms folded on the chest and then of the trunk and legs.

The normal length of labour in the second stage is in a primipara two hours and in a multipara fifteen to thirty minutes.

The Third Stage of Labour.

From expulsion of the child till the expulsion of the placenta and membranes.

The Uterus.—Directly the child has been expelled the retraction of the uterus still further increases, so that on placing the hand over the abdomen the uterus, when it is contracting, can be felt to be hard and round. The uterus then rests itself by relaxing and obtains more nourishment by allowing the circulation to continue, it having been already pointed out that owing to the coils in the arteries, when the uterus contracts, no blood can enter it. In a few moments another contraction ensues, and so on, the object of these contractions being to separate the placenta and afterwards to expel it with the membranes.

The Placenta and Membranes.—As the placenta is not an elastic body it cannot shrink. On the other hand, as the placental site retracts it does shrink. It is obvious therefore that if the two surfaces (the maternal surface of the placenta and the decidual surface of the uterus at the placenta site) are not indissolubly attached to one another, and one shrinks while the other does not, they must come apart, and so the placenta is gradually separated by the shrinking of the placental site.

As the placenta is separated the mouths of the uterine sinuses become exposed, and anyone studying the subject for the first time would naturally wonder why the patient does not bleed when the placenta is separated. The answer is because the muscle in the neighbourhood of the sinuses has retracted round them and closed them, and this is the reason why every woman does not bleed to death, or almost bleed to death, after labour. In some women, for reasons which need not here be discussed, retraction of the upper segment of the uterus is absent or inefficient. The result is serious bleeding which indeed may be so great that the woman dies

in a few minutes, unless properly treated. This complication is known as *post-partum hæmorrhage*.

After the placenta has been separated, the rhythmical contractions of the uterus, aided perhaps by the bearing down of the woman, expel it into the vagina. As it descends the placenta carries with it the amnion and chorion, those portions of the latter which have not already been separated being peeled off the uterus by its weight.

The expulsion of the placenta and membranes from the uterus and the vagina can be effected by Nature, but it is generally accomplished by art. If the patient is left alone, sometime during the next hour, stimulated by the contractions of the uterus, the woman bears down, and the placenta is expelled with its smooth foetal surface outwards followed by the inverted membranes, the amnion being outermost. Together with the placenta and membranes a small quantity of blood, and perhaps blood-clot, are expelled. The placenta, as a rule, takes fifteen to thirty minutes to separate. When it has separated, even if this be two minutes after the birth of the child, there is no reason to wait for Nature to expel it; on the contrary, for the comfort of the mother, it is better to hasten the expulsion of the after-birth by squeezing the top of the uterus and pushing it downwards and backwards to get the after-birth out of the uterus and then downwards and forwards to get it out of the vagina, the canal of the uterus and vagina respectively pointing in these directions.

The Auxiliary Muscles.—The action of these muscles in the third stage of labour has already been explained.

The Child.—A few seconds after the birth of the child it will commence to cry, or should be made to do so. This means that it has expanded its lungs and is now receiving oxygen from the air instead of from the blood of its mother. Consequently there is no more need for the heart of the child to pump blood into the placenta to become aerated, and the flow is therefore directed by other channels to its lungs. Pulsation of the vessels in the umbilical cord will, therefore, soon cease, and when it has the cord is gently pulled upon, to straighten out any coils lying in the vagina,

and then ligatured in two places, one near the umbilicus and the other close to the vulva, and the cord is then severed close to the umbilical ligature. The foetal end of the cord should then be wiped with an antiseptic swab to ensure that the ligature is preventing any escape of blood. The child is then wrapped in a clean, warm blanket and placed, for the time being, in its cot or some other suitable receptacle.

NURSING.—

It is assumed here, as in the description of the complications of pregnancy, that the nurse has been called to the patient urgently and that no certified midwife is available, and that she herself is not a certified midwife. The following remarks are to assist such a nurse until the services of a certified midwife or doctor can be procured. The training of a nurse is not complete until she has gained the certificate of the Central Midwives Board.

LABOUR: FIRST AND SECOND STAGE.—

The Bed.—The best bed is a single one, made of iron, with wire springs that do not sag in the middle. To prevent the mattress being soiled a piece of oil-cloth or macintosh should be spread over it, which, at any rate, should be large enough to reach from the waist to the knees of the patient. On top of this a blanket and clean sheet should be arranged. In addition to a pillow and bolster at the head of the bed a second and somewhat smaller piece of macintosh should be placed over the sheet and allowed to hang over the side of the bed under the buttocks. Lastly over this should be arranged a clean draw-sheet, or a labour pad which has been sterilized, and which with other sterilized articles, such as towels, sheets and a gown, can be obtained in a sealed tin from most good chemists. The patient should be covered with a sheet and blanket.

The Nurse.—The nurse should wear a clean washable dress and apron, and the sleeves should be rolled up above the elbow, or take off.

The nurse should not attend a woman in labour if she has been lately nursing any infectious case, or if she has any sore places on her fingers. She must very thoroughly wash and scrub her hands and finger-nails with soap and water for at least three minutes, and afterwards, having rinsed off the soap in clean water, she must immerse her hands in 1 in 2000 Biniodide of Mercury another three minutes.

The Patient.—The patient, if possible, should have a warm bath when labour commences, washing especially the vulva with soap and water. If the patient, because of her condition or otherwise, is unable to have a bath, the nurse should thoroughly wash the vulva with soap and water, swab this off, and then bathe the vulva with an antiseptic solution. If the hairs on the labia majora are long they should be cut.

The patient should have on a clean nightgown which can be rolled up round her waist to prevent its getting soiled, and the lower part of the body should be covered with a clean flannel petticoat.

An enema should be given, unless contra-indicated, and patient should be encouraged to pass water frequently.

The pulse-rate, temperature, the frequency of the pains and the general condition of the patient should be noted. During the first stage of labour it is better for the patient to be up and walking about, and the diet should be of a digestible and nourishing character.

Assistance : The Patient.—Any assistance that the nurse may be able to give is not required until the second stage of labour. At the end of the first stage of labour the patient, if she has not done so before, will take to her bed, lying on her left side as a rule. A stool may be placed at the bottom of the bed against which the patient can press her feet, and a towel may be tied to the rail at the end of the bed for the patient to pull upon, since by pressing and pulling during a pain, she will be the better able to bring her auxiliary muscles into action. The patient may obtain much relief from the nurse pressing on her back during a pain.

The anus, perineum and vulva should be kept swabbed with pieces of absorbent wool wrung out of Lysol or Monsol 1 in 360, and a bowl of these, containing three dozen, should be placed on a chair within easy reach. When the head is distending the vulva, a firm pillow should be placed between the knees.

The Child.—When the head of the child has been born, the nurse must carefully wipe its eyelids, with a swab wrung out in boric acid solution (1 in 20), in a direction from its nose towards its ear, a separate swab being used for each eye.

THIRD STAGE.—

The Uterus.—The patient should now be turned on her back and should be directed to draw up her legs and separate them.

The left hand of the nurse must now be placed on the abdomen over the uterus, when, if the labour is normal, she will feel the uterus becoming harder and softer alternately. If the uterus remains soft, the nurse must squeeze it to encourage it to get harder, since if it remains soft there is danger of post-partum hæmorrhage.

As a rule, the uterine pains return in about twenty minutes, and the placenta and membranes are then separated from the wall of the uterus, and perhaps in a short time, aided by the bearing-down efforts of the mother, are expelled through the vulval orifice. At times as long as two hours elapse before the placenta and membranes are expelled; or the placenta may be abnormally adherent, in which case a doctor will have to remove it.

Placenta and Membranes.—After the placenta has been separated the nurse cannot do any harm by squeezing the uterus, and at the same time pushing it downwards and backwards until she feels the placenta slip out of the uterus into the vagina, and then downwards and forwards to get it out of the vagina. It is very dangerous, however, for a nurse to attempt this manœuvre before the placenta has separated (unless there is post-partum hæmorrhage), as

part of the placenta only may be separated, with the result that post-partum hæmorrhage may occur.

The correct way to squeeze the uterus when expressing the placenta is with the thumb of the left hand in front of the uterus and the fingers at the back (Fig. 13). This is also the way to hold the uterus when squeezing it to stop post-partum hæmorrhage.

There are various ways of ascertaining whether the placenta has separated, a very important point, since in normal labour the placenta must not be expressed till it is separated. The easiest way, for a nurse not specially trained, is for her to notice whether the vulval ligature has slipped away from the vulva, if so this will be an indication that the placenta has separated. As the placenta is expelled it should be held in the right hand, the left hand meanwhile pressing on the uterus. The membranes should not be pulled upon, but should be allowed to slip out. If the membranes do not slip out the placenta should be rotated, which will twist the membranes into a rope and then, as they will be less likely to break off short, it is permissible to pull on them gently. The nurse must keep the placenta and membranes for the doctor to examine.

The Patient.—After the placenta and membranes have been expelled, the vulva should be carefully swabbed, and a sterilized pad, or if this is not procurable, a pad that has been scorched in the oven, should then be applied. Any linen that is soiled should be removed and an abdominal binder adjusted. As a medical man will be in attendance, or will have been sent for, he will wish to examine the patient so as to ascertain whether the perineum or vagina have been torn.

The nurse must not leave the patient if the pulse-rate is above 100, if the uterus does not contract well or if there is any undue bleeding.

The Child.—The child should be bathed in front of the fire, the nurse being seated on a low chair nearby, and having a macintosh apron covered by a clean flannel apron over her lap.

The first thing the nurse should do is to wipe carefully the eyes, nose and ears of the child with pieces of linen dipped in the boric acid solution, using different pieces for each.

The greasy white material covering the child is then removed with olive oil and a little soap and water. Linen or swabs must be used for this purpose, not a sponge. The temperature of the water in the bath should be 99° F.,



FIG. 13.—Body of woman cut in half to show the correct position of the left hand of the nurse when expressing the placenta. Note that the thumb is in front of the uterus and the fingers behind.

the soap used should be free of alkali, and the towels used to dry the child should be soft. After the child is dried it should be well dusted with a good pure powder.

The child should be bathed once a day and the same water must never be used for its face and its body.

Unless the stump of the umbilical cord is dressed very carefully it may become septic, in which case the child may very likely die.

The cord must be kept as dry as possible. It should therefore be threaded through a hole in a piece of sterilized linen, turned up along the child's abdomen, and then completely covered with boric acid powder, or better still, with a powder consisting of zinc oxide 1 part and starch 3 parts. The cord and powder are then covered by turning in the piece of linen all round, after which a flannel binder should be applied and the ends stitched.

A soft diaper should then be attached to the binder and the diapers should be changed whenever they are soiled; and soda should not be used when washing them. To prevent the meconium (first fæces) and the fæces from irritating the buttocks, the latter should be smeared, before the diapers are applied, with a little olive oil.

The child should be dressed in warm loose clothes and then placed in its cot. In no circumstances should the nurse allow the child to sleep in its mother's bed, many children are suffocated by overlaying.

POST-PARTUM HÆMORRHAGE.

The emergency which a nurse, who is summoned urgently to attend a confinement, will most likely be called upon to treat is post-partum hæmorrhage. Should any other complication occur there will be, practically in all cases, sufficient time for the attendance of a doctor.

CAUSE.—

1. Deficient retraction of that portion of the uterus from which the placenta has separated. As a result the uterine sinuses in the placental site are not efficiently closed and therefore blood escapes.

2. Absence of contraction of the upper uterine segment. In other words, the uterine muscle is exhausted and, for the time being, is in a paralytic condition. Here again the blood is escaping from the uterine sinuses, as these remain open.

3. Laceration of some portion of the genital track, involving a large artery; as a rule in such cases it is the cervix that is torn, the uterine artery being involved.

4. Inversion of the uterus (turning inside out). The uterine sinuses remain open.

TREATMENT.—

Efficiently to treat post-partum hæmorrhage the nurse must know the cause, and must, therefore, satisfy herself whether the bleeding is coming from the uterine sinuses in the placental site or from a torn artery.

Such a diagnosis is not difficult, since if the bleeding is from a torn artery, the uterus will be *hard*, whereas if it is from the placental site the uterus will be *soft*. Moreover, if from a torn artery, the blood may be seen spurting from the vagina.

If the bleeding is from the placental site it is due, as already mentioned, to deficient retraction, no contraction, or inversion of the uterus. Inversion of the uterus is very rare, and this organ is most unlikely to be inverted unless the nurse has, very reprehensibly, pulled on the umbilical cord to deliver the after-birth. In this case the outside of the uterus cannot be felt from the abdomen, but its inside can be felt occupying the vagina, or can be seen projecting through the vulval orifice.

In the absence of a laceration or inversion, this leaves the diagnosis between deficient retraction and no contractions. It does not matter whether this differential diagnosis is made by the nurse or not, since deficient retraction being by far the commonest cause of post-partum hæmorrhage, the nurse must treat the bleeding on this assumption. It is only when the measures to be described for treating deficient retraction have failed that the diagnosis of exhausted uterus, being the cause of the bleeding, is arrived at.

* Deficient Retraction.—

Before the placenta has been expelled.—The nurse should at once vigorously squeeze the uterus which is held as

* The best preparation to make the uterus contract so that the uterine sinuses are closed, is pituitary extract (10 units). The next best is *Fermergin* (1 ampoule or 1 tablet). This preparation does not act so quickly as the pituitary extract, but is far more efficient in its action than the

depicted in Fig. 13. If the bleeding does not stop she should by squeezing the uterus and pushing downwards and backwards, and then downwards and forwards, endeavour to expel the after-birth. If such measures fail the correct procedure is, with the left hand on the abdomen, squeezing the uterus meanwhile, to pass the right hand up into the uterus, using the umbilical cord as a guide, and then to peel off that part of the placenta which is still attached to the uterus. After she has separated the placenta the nurse pulls it out together with the membranes. When the after-birth has been removed the nurse should give a hot antiseptic douche, 120° F., and if the bleeding does not then stop she should pass the douche-nozzle into the uterus and give an intra-uterine douche.

The manual removal of the placenta is attended with much danger, since the uterus may thereby be infected. The nurse, therefore, should delay such treatment until she is certain that it is absolutely necessary.

After the placenta has been expelled.—In this case squeezing the uterus and a hot antiseptic douche should suffice.

No Contractions.—

If the measures detailed above fail to arrest the bleeding, the latter is due to the fact that the uterus, for the time being, is paralysed. This very dangerous condition is fortunately rare. The only thing the nurse can now do is to compress the uterus between her two hands (Fig. 14). The left hand over the abdomen presses the back of the uterus, and the right fist in the vagina, and in front of the cervix, presses the front of the uterus. This method stops the bleeding by bringing the inner walls of the uterus into contact, and if properly applied the bleeding must be arrested, there being no cavity into which blood could escape.

This method cannot without assistance be kept up for long. If, however, the nurse rests the elbow, corresponding to her internal hand, on the bed and gets some one to press usual preparations of ergot, which should be the last choice. The nurse should administer the drugs in this order, according to which of them she may chance to possess, or is able to obtain.

upon her external hand, bimanual compression can be kept up for a long time.

Lacerations.—

A hot antiseptic douche should be given. If this fails to stop the bleeding the only thing the nurse can do is to pack the vagina.

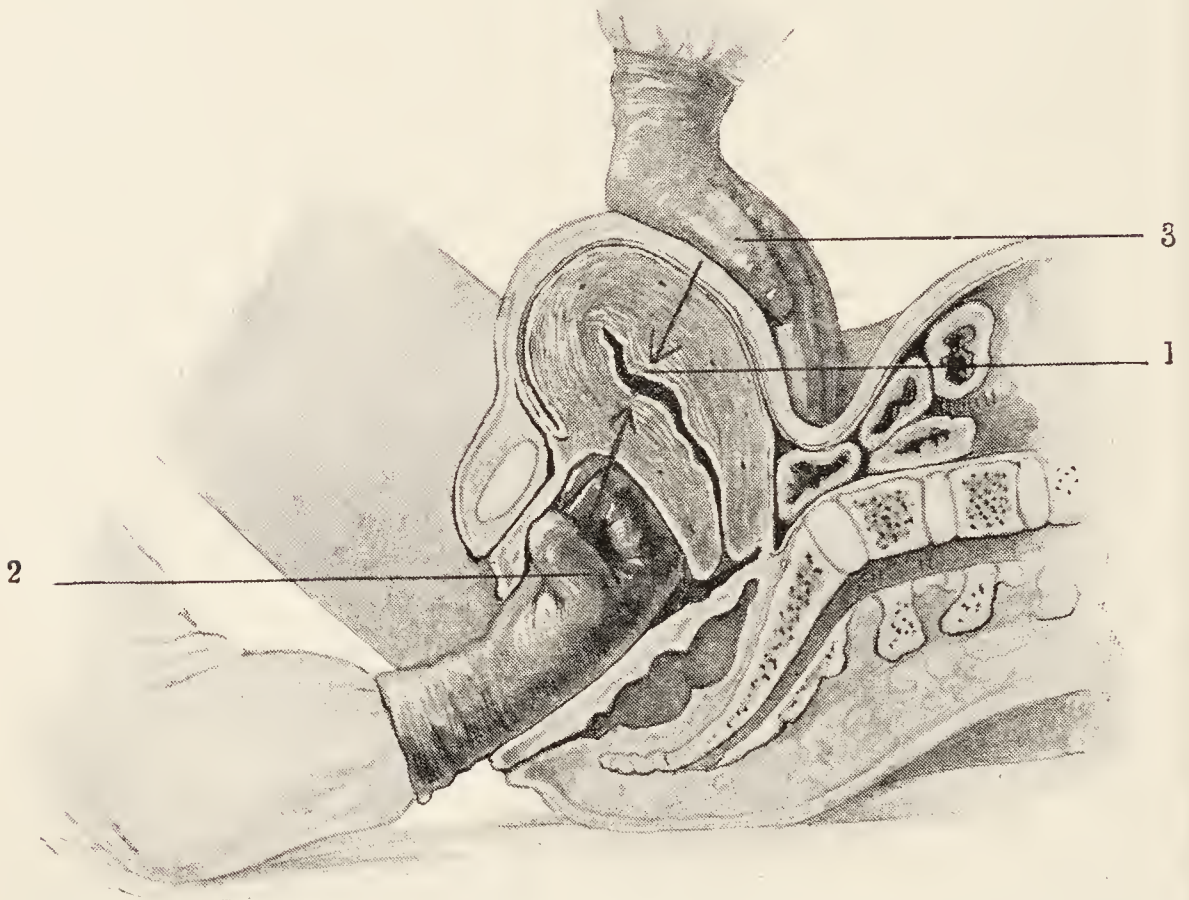


FIG. 14.—Bimanual compression. Body of the woman cut in half to show the right fist of the nurse in the vagina pressing up the anterior wall of the uterus, and the left hand of the nurse over the abdomen pressing forwards the posterior wall of the uterus. 1. Placental site; 2. Right fist; 3. Left hand

Inversion of the Uterus.

In some cases of inversion of the uterus there is no bleeding, when, pending the arrival of the doctor, the nurse should apply stimulants to counteract the shock. If there is dangerous bleeding the nurse must endeavour to push the uterus back, by taking the inverted portion in her right hand, squeezing it and then pushing it upwards and back-

wards, removing the placenta if necessary. The uterus should be supported with the left hand on the abdomen as it is pushed back into position. After the uterus has been re-inverted, the nurse should give the patient a hot antiseptic douche.

NURSING.—

A woman who has had post-partum hæmorrhage may be in a very precarious condition, and unless treated very carefully may yet die although the bleeding has stopped.

The nurse should, therefore, keep the patient absolutely at rest not letting her move at all. Any exertion, because of the heart being so weak, may bring on an attack of syncope and the patient may die suddenly. As so much liquid has been lost the nurse must increase the quantity in the patient's blood in the form of frequent drinks of water and rectal salines. The doctor may give a sub-cutaneous or an intra-venous saline injection or a blood transfusion. The escape of blood will have resulted in a loss of heat, and hot-water bottles, suitably protected, must be placed round the patient. Lastly, the more fresh air the patient can get the better, since she has lost so many billions of oxygen carriers. The windows should, therefore, be opened, the patient being protected from draughts.

LYING-IN PERIOD.

If a nurse has to attend a woman during her lying-in period she will be given directions by the doctor as to the feeding of the child and other matters.

The nurse must encourage, nay insist on the mother nursing her child unless the doctor gives orders to the contrary. The death-rate of breast-fed children in their first year of life is far smaller than that of bottle-fed children, and for this reason alone every woman should suckle her child. *There are many other reasons.*

It will be the duty of the nurse to take the temperature and pulse-rate of the mother as often as the doctor directs, and she should chart this information as well as the number

of times the bowels have acted and any other information she considers necessary. As retention of urine occasionally occurs after labour the nurse must assure herself that the patient is passing sufficient urine, and if not must examine the abdomen to ascertain if the bladder is distended. The frequent passage of small quantities of urine may signify that the patient has incontinence or retention. The diapers should be kept for the doctor to see.

The nurse must keep the patient scrupulously clean, washing the hands and face of the patient twice daily and sponging her body once daily. The hair should be properly brushed and plaited. The diapers should be changed several times a day for the first week and after this four times a day. The binder must be adjusted each day and the draw-sheet removed whenever soiled. The lying-in room should be kept well aired.

With regard to the diet of the patient and any aperient she may need, the doctor will give the requisite directions. The breasts should be supported with pads of wool and a bandage, as during the first three days they will become heavy, tense, and painful.

The patient should be encouraged to sit up in bed after she has had a good rest. In this position the lochia (discharges) can escape more easily and so there will be less chance of sepsis, and the uterus is not so likely to fall back.

Lastly the nurse must be most careful to report anything unusual in her patient to the doctor. Dislike for food and inability to sleep, at times usher in puerperal insanity and puerperal fever.

CHAPTER VII.

EXTRA UTERINE GESTATION.

THERE are four situations in which an oocyte can become fertilized if a spermatozoon can reach it, namely:—

1. In a Graafian follicle, after this has burst but before the oocyte has been discharged.
2. In the abdominal cavity, after the oocyte has left the Graafian follicle but before it has been grasped by the Fallopian tube.
3. In the Fallopian tube, before it has reached the uterine cavity.
4. In the uterus after it has left the Fallopian tube.

Fertilization has never been proved to have taken place in the abdominal cavity or in the uterus. It is a fact that rarely a foetus may be found free, except for certain attachments taking the place of the normal placenta, in the abdominal cavity, and such foetuses very rarely go on living and growing to term. Nevertheless in the majority of such cases there is distinct evidence that the foetus was first in the Fallopian tube and escaped therefrom later, and in the remainder the evidence has never been such that competent authorities would admit that the gestation was primarily abdominal. There does not appear to be any reason, however, why primary abdominal gestation should not occur. As far as the uterus is concerned there is much more doubt. It has already been stated that when the blastocyst reaches the uterus it bores its way into the decidua by means of the external cells of the chorion (trophoblast). Now it takes an appreciable time for the single celled zygote to divide up into a multicellular blastocyst,

the outer covering of which is the chorion, and this presumably is why, normally, the oocyte is fertilized in the Fallopian tube, so that by the time it has reached the uterus the trophoblast will be formed sufficiently to enable it to get attached to the decidua. If the zygote was to arrive in the cavity of the uterus before the primitive chorion was formed, it would presumably be unable to bore its way into the decidua and would be discharged, as the unfertilized ovum that passes into the uterine cavity must be, *per vaginam*.

During the last few years the systematic examination of every organ removed from the pelvis has become a routine in well-organized hospitals, and so it has happened that blood cysts of the ovary in a certain number of cases have, on microscopical examination, been found to be due to ovarian pregnancy.

Lastly, gestation in the Fallopian tube is comparatively common and its existence has been known for many years. Moreover, in animals it has been proved that the oocyte is always fertilized in the Fallopian tube. From a consideration of these two points, therefore, it seems most probable that the oocyte of the human female is normally fertilized in the Fallopian tube.

Tubal Gestation.

CAUSE.—

Tubal gestation is due to the fact that the oocyte, in its passage from the ovary to the uterus, having become fertilized in the Fallopian tube is there arrested and continues to develop. Why the zygote becomes arrested in the tube and does not travel down into the uterus is unknown.

When the zygote is arrested in the tube it subdivides and behaves in exactly the same way as it would have done if it had reached the uterus. It commences to bore its way into the mucous membrane of the Fallopian tube. This in every instance, with one exception, leads to a disaster. The exception is when the zygote dies before it has time to cause

the disaster, and this, as far as is known, is a very rare occurrence.

If the short account of the development of the foetus on page 35 is understood, it is easy to realize why disaster follows the implantation of the blastocyst in the mucous membrane of the Fallopian tube.

In bygone ages the developing blastocyst learnt to bore a certain distance into the mucous membrane of the uterus and no further. To meet the depth of this intrusion the mucous membrane of the uterus undergoes certain changes, one of which is an increase in its thickness. Now the mucous membrane of the Fallopian tube, to start with, is not so thick as that of the uterus, moreover, it does not undergo changes, when the woman becomes pregnant, similar to those in the uterus.

As the blastocyst does not stop until it has reached a certain depth, and as this depth is greater than the thickness of the mucous membrane of the Fallopian tube, it results that the muscle of the tube must be penetrated, and in this muscle are blood-vessels. In due course one of these vessels is opened by the erosion of a chorionic villus. The result is inevitable; blood escapes between the muscle fibres and round the zygote. The tube, being unable to stand the pressure of the effused blood, ruptures and the blood escapes carrying with it the blastocyst with one of these results:—

1. The blood may burst out of the tube, in which case the mother may die, or she may live, the local condition being known as a pelvic hæmatocele, which signifies a collection of blood in the pelvic cavity. This is called *tubal rupture*. The blastocyst is destroyed.

2. The blood may burst into the lumen of the tube and then escape through the abdominal opening of the tube with similar results to the above. This is called *tubal abortion*. The blastocyst is destroyed.

Very rarely the blastocyst erodes through the walls of the tube without injuring any large blood-vessel, and oozing, as it were, through a small hole in the peritoneal coat becomes adherent to intestine or omentum and continues

to develop, even in very rare cases, to term. This is called *tubal erosion*. The mother at the time of the tubal erosion may experience some slight abdominal pain, but nothing more.

Of these events tubal erosion is by far the rarest.

It is interesting to note what may happen subsequent to a tubal erosion:—

1. The foetus may die and become converted into a mummy. The dead foetus may become impregnated with lime salts and a lithopædion results, or it may become converted into soap (adipocere). The foetus may remain as a mummy or lithopædion for many years; in fact, the woman may live to old age and die of some intercurrent disease.

2. The mummy or lithopædion may, however, become infected by microbes from the intestine and suppuration result, the pus and bones escaping into the bowel, bladder, vagina, or through the abdominal wall; the patient dying or not as the case may be.

3. The sac surrounding the foetus may rupture and furious internal bleeding take place, the foetus being destroyed and the mother dying unless rescued by immediate operation.

4. The foetus may continue to develop till term when a false labour will take place. Then either the foetus will die and the further changes will be similar to those described under 1 and 2 or the sac will rupture, and the result will be similar to that mentioned under 3.

SYMPTOMS AND SIGNS.—

Before Tubal Rupture or Abortion.—Tubal rupture or abortion takes place before the twelfth week of pregnancy, as a rule between the sixth and the tenth week. It has taken place ten days after impregnation.

The woman in the majority of cases will give a history of having missed one or two periods, perhaps of a little morning nausea, and maybe of the breasts having become tender and a little swollen. In addition she will certainly complain of pain in the lower abdomen on one or other side.

At Tubal Rupture or Abortion.—A history similar to that noted above may be obtained : in addition the woman is suddenly seized with great abdominal pain and she will most likely faint and break out into a cold perspiration. On recovering consciousness she may be sick.

Her pulse is feeble and soft, and its rate will be very rapid. She will be deathly white, her temperature may be sub-normal, and she may be restless. She will complain of faintness, noises in the ears, and perhaps of want of breath—"air hunger."

She has a feeling of sinking through the bed, respiration may be hurried and of a sighing character, the surface of the body is cold ; in fact, all or many of the signs and symptoms of serious internal hæmorrhage may present themselves.

So great can the loss of blood be that the patient may suddenly fall back dead or die in a few minutes, or in less marked cases she may die in a few hours unless rescued by operation.

Just before, or at the time of tubal rupture or abortion, a dark brown discharge may flow from the uterus, and if special care is taken to examine carefully this discharge, a membrane, which is the lining of the uterus, will be found, either whole or in pieces.

The identification of this membrane is most important, as at times the diagnosis between tubal gestation and an ordinary miscarriage may be very difficult to determine, and the examination of the piece of membrane will settle the matter. The nurse must therefore be careful to save everything that is passed from the vagina for the inspection of the doctor.

After Erosion.—The symptoms will be those of pregnancy corresponding to the period to which the fœtus has developed, together with, as a rule, some abdominal pain, and the woman may seek advice because "the child is all on one side."

If, during any time, the sac ruptures, then all the signs and symptoms of internal hæmorrhage will be present.

If the pregnancy goes to term a false labour comes on with regular pains and discharge.

Tubal rupture or abortion is in most cases easily diagnosed and is a condition which every trained nurse sooner or later will have to nurse. An example of how typical such cases are is that of a patient who was admitted to the Middlesex Hospital. The husband of this patient was in the habit of visiting one of the Public Libraries in the neighbourhood. In due course he came across a work by Sir John Bland-Sutton and was very interested in the description of tubal gestation contained therein. One day his wife became alarmingly ill and the symptoms and signs that presented themselves to the husband, as far as he could recognize them, tallied exactly with those described in the aforementioned work. Accordingly the husband hastened to the hospital and asked the House Surgeon on duty to admit his wife because she had a ruptured tubal gestation. The House Surgeon was recently qualified, the husband was of the artisan class, and it is easy to imagine the conversation that must have taken place, the House Surgeon incredulous, the husband insistent. In the end the House Surgeon was so impressed by the despair of the husband that he agreed to admit the wife from whom, shortly after admission, a ruptured tube was removed and her life undoubtedly saved.

TREATMENT.—

Tubal gestation is a very dangerous complication. If the condition is diagnosed before rupture or abortion the diseased tube should be removed in order that none of the aforementioned complications may take place.

If the patient is suffering from internal hæmorrhage, due to tubal rupture or abortion, an immediate operation is necessary.

There is a difference of opinion among doctors in cases in which the first shock has passed off and the patient is apparently getting better, and there is a collection of blood in the pelvis known as a pelvic hæmatocele.

Some consider that all these patients should be operated

upon, because, as they rightly say, there is no knowing for certain whether the ovum is dead, and if not it may continue to grow and an extension of the tubal rupture result, or if tubal abortion is taking place the ovum may not have escaped from the tube, and further hæmorrhage will occur before it does so. Others consider that these patients should be left to recover naturally unless any further complication arises, because they contend that the mortality with this treatment is not so great as if all these cases were operated upon.

There is no doubt that the danger of leaving a woman who has had signs and symptoms of a ruptured tube or tubal abortion is a very real one, and most gynæcologists have had the care of cases in which the patient has been left, and during some part of her supposed convalescence a further hæmorrhage has taken place which has killed her, or would have done so if an immediate operation had not been performed.

PART V.

DISEASES OF THE REPRODUCTIVE TRACT.

CHAPTER VIII.

ABNORMAL MENSTRUATION.

THE physiology of menstruation has already been described on page 22. The disturbances of menstruation, namely, amenorrhœa, menorrhagia, metrorrhagia and dysmenorrhœa, will now be discussed. It is important that the nurse should realize that such disturbances are not diseases in themselves, but only an expression of some abnormal condition, either of a general or local kind, and that they are in fact symptoms. Moreover, these symptoms are common to many gynæcological diseases.

AMENORRHŒA.

Menstruation should occur once a month between puberty and the menopause, unless the woman is pregnant or is suckling her child. If the period fails to appear at its appointed time the condition is known as amenorrhœa. There are certain malformations of the genital organs, however, which prevent the menstrual discharge from escaping, and persons thus afflicted may appear to be suffering from amenorrhœa, although they are not; this condition is really one of hidden menstruation and the symptom of amenorrhœa is therefore misleading.

Females in whom the period does not appear can thus be divided into two groups, that in which the menstruation is really in abeyance and that in which the cessation is only apparent.

Real Amenorrhœa.

Real amenorrhœa may be due to some condition which is either constitutional or local.

CAUSES.—

Constitutional.

1. Late puberty.
2. Pregnancy.
3. Lactation.
4. Early menopause.
5. Disease.

Local.

6. Congenital.
7. Disease.
8. Operation.

CONSTITUTIONAL.—

1. *Late Puberty.*—Menstruation starts, as a rule, about the age of 14. Nevertheless in some cases it is delayed till the girl is 17 or even older, and yet in such circumstances the individual appears to be in perfect health. Moreover, in many cases although the first period came on at the usual time the succeeding periods only appear after an interval of a year or so. It is important for nurses to remember that amenorrhœa in itself is not necessarily harmful to the individual, in fact it may be Nature's method of protecting the girl, as, for instance, in cases of anæmia, when obviously the less blood that is lost the better.

2. *Pregnancy.*—A woman who is pregnant does not menstruate. The amenorrhœa of pregnancy is in most cases sudden; that is, up to the time of fertilization the woman has been quite regular; or, to put it another way, supposing a woman has been quite regular, and menstruation does not appear when it is due, then be she single, married, or a widow, rich or poor, or whatever her religious denomination may be, the most likely cause of her amenorrhœa is pregnancy. Rarely women become pregnant when suffering from

amenorrhœa due to some constitutional cause, and very rarely girls will become pregnant before menstruation has ever appeared.

3. *Lactation*.—As a rule a woman does not again menstruate till she has been suckling her child for seven or eight months. In some cases the periods do not appear till two or three months after the child is weaned. The mother, however, may not finish weaning her child, as she should, at nine months because of the expense of buying milk, the trouble of preparing the food, or in the expectation that any further pregnancy can be prevented. In such cases the periods may become irregular or excessive. Some women menstruate regularly while nursing their children; and if the child thrives and keeps its weight, and the mother is healthy, there is no necessity for her to give up suckling.

It is not at all uncommon for women to become pregnant in spite of the fact that they have been suckling their babies for eighteen months or longer, and in whom menstruation has not reappeared since the birth of their last child.

4. *Early Menopause*.—The change of life usually supervenes between the ages of 45 and 50. In some women, however, even in the absence of local disease, it is delayed as late as 52, while in others, for no apparent reason, it may supervene at 35 or even earlier. The menopause is not concerned only with the cessation of menstruation, since there are other symptoms and signs (see page 27), and especially the genital organs atrophy. In those women, however, in whom the periods stop prematurely, these additional symptoms and signs do not necessarily appear.

5. *Disease*.—The commonest constitutional causes of amenorrhœa are constipation, chlorosis, and anæmia. In these cases the cessation of the menstrual function takes place, as a rule, gradually—that is, the amount lost at successive periods decreases until amenorrhœa results.

Among other causes are tuberculosis, cardiac disease, myxœdema, the acute specific fevers, and insanity, and

women the victims of drugs or alcohol, may suffer from amenorrhœa. Amenorrhœa also at times follows some disturbance of the nervous system. Thus the fear of pregnancy or the desire to become a mother, a sudden fright or great grief may result in suppression of menstruation.

LOCAL.—

6. *Congenital*.—If the uterus or ovaries are absent menstruation cannot take place. This abnormality is, however, very rare. On the other hand, there is a condition in which the uterus and ovaries do not develop at puberty, but remain, in size and shape, similar to those of an infant, and amenorrhœa results.

In a woman with an infantile uterus and ovaries the other signs of sexual maturity may be absent. In such cases the breasts remain small, the vulva and mons veneris ill-developed, and the pubic hair is very scanty. The woman may also approximate to the male type, hair appearing on the upper lip, the voice becoming harsh, and the pubic hair reaching towards the umbilicus.

7. *Disease*.—If the ovaries are both destroyed, as in cases of double ovarian tumours or abscesses, amenorrhœa ensues. As long, however, as there is some healthy ovarian tissue left the woman may menstruate.

Of the various local diseases of the genital organs which cause amenorrhœa, ovarian tumours are the most common, but then only when both ovaries are destroyed. Regular menstruation is quite common if one ovary or part of an ovary is intact.

8. *Operation*.—If the uterus is removed (hysterectomy) permanent amenorrhœa results. An operation necessitating the removal of both ovaries is followed by amenorrhœa. If, however, even a minute portion of ovary has escaped the surgeon's notice and the uterus is left, menstruation may continue.

In hospital practice it is often left to the sister of the ward to explain to the patient that if, in the course of the proposed operation, the uterus, ovaries, Fallopian tubes or

all three have to be removed the patient will be sterile, and in the case of the uterus or ovaries her menstruation will also stop. It is most important that patients should be warned of such risks, otherwise, in spite of the fact that they signed a book giving the surgeon leave to do what he thinks necessary, they may afterwards contend that they did not understand the nature of the operation as far as its results were concerned.

Apparent Amenorrhœa.

CAUSES.—

Congenital.—In rare cases the patency of the vaginal canal is obstructed at some spot, generally in the neighbourhood of the hymen, by a membrane stretching across it; more rarely the hymen has no orifice piercing it, rarer still some portion, or even the whole, of the vagina may be absent; and, lastly, the cervical canal may be absent.

All the causes of apparent amenorrhœa must be local, the menstrual discharge from the endometrium being held up by some obstruction below the level of the internal os.

SYMPTOMS.—

Taking the commonest cause of this condition, a septum across the lower end of the vagina, the history one obtains is very instructive.

The girl complains, once a month, of abdominal pain, backache, and the other general symptoms of menstruation.

SIGNS.—

In due course, if the mother is careless and delays seeking medical advice, the girl's abdomen will gradually, month by month, become more prominent. This alteration in size is due to the formation of a swelling caused by the accumulation of the menstrual fluid in the vagina (Fig. 15). In such cases, if the nurse examined the vulva, on separating the labia she would notice that the hymen was bulged forwards by a purplish swelling. Some girls are so uncomplaining, and some mothers so ignorant, that

advice is not sought until the accumulation of menstrual fluid in the vagina has become so great that the urethra is pressed upon, and retention of urine results.

If the obstruction is at the cervical canal the vaginal signs and those of retention of urine will not appear. In this case the condition can only be diagnosed by a medical

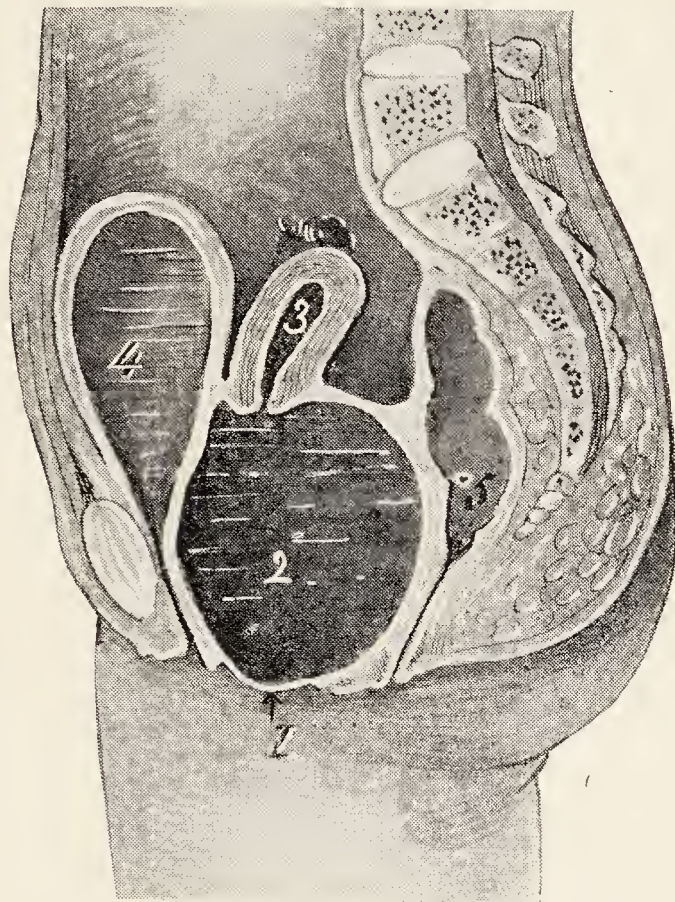


FIG. 15.—Body of woman cut in half to show the condition of apparent amenorrhœa due to the fact that the hymen, during its development, was not perforated. 1. Hymen depressed; 2. Vagina distended; 3. Uterus, cavity a little distended; 4. Distended bladder; 5. Rectum.

man, the menstrual discharge being retained in the uterus and Fallopian tubes.

Disease.—Inflammation of the lining of the cervical canal or vagina, leading to ulceration, may result in the opposing surfaces becoming adherent one to the other. As a result the respective canals, or part of them, are obliterated, the menstrual fluid being retained above the obstruction. Such inflammation may be due to one of the acute specific fevers

occurring in a child, the local condition remaining unnoticed on account of the severity of the general symptoms. It may also follow injury to the vagina or cervix during labour, or an operation on these parts.

SYMPTOMS.—

The symptoms of apparent amenorrhœa due to disease, will be similar to those described under the congenital variety, except that menstruation will once have been normal, and there will be a history of some cause.

TREATMENT.—

Real Amenorrhœa.—There are a large number of patent medicines advertised for the cure of real amenorrhœa, but few of these are of any value, and many are positively harmful.

The proper method of treating amenorrhœa is first to discover the cause by a careful examination of the patient and then to treat it.

The commonest cause of amenorrhœa in young girls is chlorosis and constipation. In the unlikely event of such a person being unable to get medical advice for some time, a nurse who recommended some preparation of iron and impressed upon the patient the absolute necessity of a daily action of the bowels would probably be rendering her a good service.

Apparent Amenorrhœa.—The treatment for apparent amenorrhœa is, if possible, to remove the obstruction by an operation. In the commonest conditions of a septum across the vagina or imperforate hymen this is very easily accomplished by incising the membrane. If, however, the whole vagina, or large portions of it, are absent, although a canal can be fashioned by operation up to the uterus, it is so difficult to prevent the raw surfaces thus made from again adhering that the uterus may have to be removed to effect a cure.

The nurse who is looking after a patient upon whom such an operation has been performed must be most careful

that the retained menstrual fluid, as it is discharged, does not remain in contact with the vulva for any length of time, since it forms the best material in which certain dangerous, but common microbes, can exist, and there is great danger that such septic microbes may infect the genital tract. The vulva, therefore, should be well swabbed with an antiseptic solution every time the diaper is changed, which should be often.

BLEEDING.

The traditional division of bleeding from the genital tract in women into menorrhagia and metrorrhagia has but little to recommend it. Menorrhagia signifying an excessive loss of blood at the menstrual period, and metrorrhagia any loss between the periods would be very suitable terms if all causes of abnormal bleeding could thus be pigeon-holed. Unfortunately from the point of view of examinations, and more especially from that of practice, such a division will not stand criticism. The most that can be said is that an excessive loss of blood at the time the period is due may be due to some general cause or some local cause, whereas bleeding between the periods must be due to some local cause.

There are many conditions which give rise both to excessive bleeding at the periods, and bleeding between the periods, and it is this which makes the division of causes into menorrhagic and metrorrhagic unsatisfactory.

Whether the amount of blood lost at the menstrual period is really excessive, must in the first place be considered in relation with the usual (normal) loss of the individual. The amount lost can roughly be gauged by the number of diapers a woman uses. This will surely vary in different women apart from the amount lost, but it may be taken that if a woman of nice habits uses more than twelve diapers, the loss is generally excessive. Certainly if a history is given of having to use two diapers at once, of having to use thick Turkish towelling, absorbent wool in addition to the diaper,

or of the presence of clots, the loss is excessive. On occasions young girls or women, for purposes best known to themselves (a patient I once saw wanted to get leave off school for a term), will declare that they are losing excessively at their periods, when their general appearance and condition makes one doubtful if such is the case. An inquiry, perhaps of the mother, as to the number of diapers used may elicit the reply that she does not know, because her daughter always burns them. The amount of blood lost—apart from the clots, if any, passed during menstruation and defæcation—can be quite accurately determined by weighing the diapers before use and after use, the difference being the weight of blood lost.

The failure to remember, on the part of the doctor or nurse, that excessive loss at the periods may be due to some local disease, has been the cause of countless deaths.

GENERAL CAUSES.—

Anæmia may be the cause of excessive bleeding, although one variety, and that the commonest, chlorosis, is associated with amenorrhœa. Of the different varieties of anæmia the *pernicious* form is the most likely to increase the menstrual flow. *Hæmophilia*, a very rare disease in women, *purpura hæmorrhagica* and *scurvy* complete the list.

Acute Infectious Fevers.—

Pelvic Venous Congestion.—In the *newly married*, in women suffering from certain diseases of the *liver and kidney*, in women who intermittently indulge excessively in alcohol or harbour habitually a *loaded rectum*, pelvic congestion may be marked. Chronic alcoholism is a cause of amenorrhœa. Late hours, high living, and the modern sex novels and plays are perhaps more responsible as a cause than one realizes.

Nervous Disorders.—Strain on the nervous system by *fatigue, shock or emotion* may lead to an excessive period or periods.

Abnormal Action of the Endocrine Glands.—*Myxædema* is associated with increased losses, as is also the early stage

of *exophthalmic goitre*, the thyroid secretion being at fault, and although there is no proof it may be that the excessive losses occurring in some girls at *puberty*, and before the usual age of puberty, may be due to an abnormal action of the ovary or hyperactivity of the thyroid gland, and those occurring at the *menopause* may also owe their origin to some deficient working of the endocrinal glands.

Excessive loss at the time the menopause may be expected to ensue should always be viewed with the greatest suspicion. It is true that more women lose excessively at their periods between the ages of 45 and 50 than at any other time of their menstrual life. *In the majority of cases, however, this loss is due to some local disease, a very common cause of which is cancer.* Nevertheless there are numbers of women who lose excessively between the ages of 45 and 50 and in whom no local disease can be discovered and after which menstruation ceases for good. It is not difficult to realize, therefore, why an excessive loss, or losses, at such a time should be attributed by the laity to the menopause. The pity of it is, however, that some trained nurses, and some doctors, labour under a similar misapprehension, and in the first case do not advise the woman to seek medical advice, and in the second do not examine them locally even when they do. This mistaken idea on the part of the laity, such nurses and such doctors, is responsible for the deaths of many women every year. If those patients, in whom an efficient local examination fails to disclose any disease, are carefully questioned, it will be found that the excessive hæmorrhages are separated by intervals of some duration in which no blood is lost, and, moreover, when the bleeding does come on it is not necessarily when menstruation might have been expected; thus there may be intervals of weeks or months between the hæmorrhages. It is only in such circumstances that a diagnosis of the menopause can be advanced with any safety. In the absence of any marked intervals, the cause will surely be that of disease.

Prolonged Nursing.—Some women to save trouble or the cost of buying milk may continue to nurse their children

well into the second year following their last labour, and again under the mistaken idea that pregnancy may thereby be prevented. In such cases the periods may become excessive, which is not only bad for the health of the woman, but also for that of the child, who will be deprived of the proper quantities of the essential constituents of food necessary for its health and growth.

Change of Climate.—It is a common experience for women leaving a temperate climate to live in a hot climate to have excessive periods.

LOCAL CAUSES.—

The local causes of bleeding in women which may increase the loss at the periods and are responsible for a loss between the periods are many. The following may be met with and are better detailed under the various genital organs :—

Ovaries.—Although ovarian tumours as a rule do not interfere with menstruation until the health of the patient is very deteriorated when, as a rule, amenorrhœa results, there are certain tumours which are associated at times with excessive uterine hæmorrhage. These are malignant and dermoid tumours.

Fallopian Tubes.—*Malignant disease of the Fallopian tubes* is a very rare cause of bleeding, the cherry coloured blood escaping into the uterus and then discharged.

Uterus.—Innocent tumours such as *fibroids*, *mucous polypi*, *adenomyoma*, and malignant tumours such as *carcinoma*, *sarcoma*, and *chorion-carcinoma*. Inflammations of the endometrium such as *acute and chronic endometritis*, and of the rest of the uterus as in *chronic metritis* (fibrosis).

Ulceration of the cervix due to carcinoma, sarcoma, syphilis, tubercle, to an ill-fitting or neglected pessary or to some other foreign body may be the cause of the bleeding, as also may chronic inversion and subinvolution.

Vulva.—*Carcinoma*, *sarcoma*, *injury*, or ruptured *varicose veins*, and *syphilitic ulceration*, *cancer of the urethra*, and rarely an urethral caruncle may be the cause.

This is an exhaustive list and may not be of much value to the nurse as such. It is very important, however, that a nurse should have some idea of the most likely causes, and as she has not a medical training, and as it is not her business to examine women, the diagnosis can best be set out, as in the section on "Discharges," under what are the most likely causes at various ages.

From Infancy to Puberty.—In the first few weeks of life a female child may have a slight bleeding from the genital tract, the cause is not known. Somewhat later in early childhood there are two conditions that cause bleeding and are very serious and practically always fatal, sarcoma of the cervix and malignant ovarian tumours; a third, which is not serious, is known as precocious menstruation; it is a rare condition, and the first two causes are far more likely than the third.

From Puberty to Marriage.—The common causes here are the profuse losses at the onset of menstruation, and some of the causes of venous congestion of the pelvic veins; more rarely sarcoma of the uterus and malignant ovarian tumours.

From Marriage to the Menopause.—Again, in the early years such results of labour or miscarriage as subinvolution and infection are the commonest causes, and then infection from other causes. As the patient gets older, fibroid tumours of the uterus and cancer are the chief causes, and at the menopause the excessive losses with no detectable cause.

After the Menopause.—By far the most likely cause at and after the menopause of a more or less continuous loss is cancer in some portion of the genital organs. Other causes less common being mucous polypi, senile endometritis, degenerated fibroids and simple ovarian tumours.

There are two lessons to be learned from a perusal of the foregoing. The first is never to regard an excessive loss, or irregular loss at or about the menopause as natural. This way disaster lies. Every woman with such a

symptom should be (must be?) examined internally so that cancer in its early stages may be discovered if it is present. There can be no exception really to such a statement, it is an aphorism. At times, however, some women will be met with who will refuse an internal examination. The doctor will please himself whether he continues to attend such a woman or not. If there is a marked interval, of weeks or months, between the excessive losses with no loss at all, he may be satisfied that in all probability the cause is not serious, otherwise *unless he makes the position quite clear* the responsibility is his.

The second lesson is that bleeding between the periods, for all practical purposes, must be due to some local cause. This being granted it follows that any woman with such a symptom should be carefully examined by a medical man, which examination should include a bimanual palpation, unless in single women it is obvious from an abdominal vulval or rectal examination that there is a tumour which must be dealt with.

Pregnancy.—

It will be noted that pregnancy has not been included among the causes of bleeding or under the section of “age diagnosis.” It must, however, always be remembered that an irregular bleeding in a female capable of becoming pregnant, be she single, married, or a widow, may be due to some complication of such a pregnancy, as for instance a *miscarriage, mole, accidental or unavoidable hæmorrhage*. Or the pregnancy itself may be of an abnormal type such as is seen in *extra uterine gestation*, in which condition, sooner or later, there is bleeding from the uterus. Many a doctor has thus been misled, either deeming it impossible, for social reasons, that his patient could be pregnant or because the patient was so young.

TREATMENT.—

The treatment of excessive or abnormal bleeding is, of course, the province of the doctor, and a short account of

that usually followed will be found under the headings of the respective diseases described in this handbook.

NURSE'S TREATMENT.—

The treatment by the nurse consists, for the most part, in giving the correct advice if her opinion is asked. From what has already been said it is obvious that an intelligent nurse, in such circumstances would, if she had ascertained that the periods were excessive or that there was bleeding between them, insist, as far as she could, on the woman or child having the advice of a doctor; and more than this, I think it is quite fair to say that if a woman over 40 years of age has consulted a doctor for excessive hæmorrhage and he has not examined her internally at the first or second interview, she should insist on his doing so, or change her doctor.

For the rest the nurse's assistance is likely to be sought only when there is serious bleeding going on and the services of a doctor cannot be obtained within a reasonable time.

The following methods can do no harm, and may, temporarily do much good.

Hot Douches.—The water must be prepared at a temperature of 120° F. so that by the time it is injected the temperature will be 115° F. to 118° F.

Plugging the Vagina.—This method is described on pages 270-271.

Drugs.—Fermergin in doses of $\frac{1}{2}$ ampoule or 1 tablet or an injection of pituitary extract 5 units. Both these drugs act better during labour, and better than ergot.

PAIN.

The following varieties of pain will be discussed: dysmenorrhœa, intermenstrual pain, abdominal pain, backache, pelvic pain and dyspareunia.

Dysmenorrhœa.

Dysmenorrhœa signifies painful menstruation, but it is customary to apply this term also to pain in the genital region during the week before the flow appears.

The number of females *per* hundred who suffer from dysmenorrhœa varies according to their age and to their behaviour during the menstrual period. Of late years the subject of dysmenorrhœa has been carefully studied in girls' schools and nursing colleges for young women, by women doctors, and it has been found that in 78 per cent. menstruation is normal. In the remaining 22 per cent., slight discomfort was felt in 17 per cent., the pain was sub-acute in 2 per cent., and disabling in 3 per cent.

These figures are a great advance on those of former investigators, who showed that 70 per cent. of women complained of some pain or discomfort during or just before menstruation, and that in 10 per cent. of these the pain was severe enough to interfere with the customary vocation of the woman.

The reason for this discrepancy is to be found in the fact that school girls and young women are now taught to regard menstruation as a perfectly normal function, which should not be allowed, unless it becomes abnormal, to interfere with their usual customs or activities.

In the past the menstrual period has been regarded by many mothers, school mistresses, and doctors as a time of semi-invalidism, and rest in the recumbent position, the application of hot-water bottles to the abdomen and the use of drugs, when there was the slightest discomfort, advocated.

Such treatment, in most cases, merely encouraged dysmenorrhœa to develop, and by the time the girls arrived at womanhood 70 per cent. complained of pain or discomfort.

If the modern rules of hygiene of the menstrual period are carried out, there is no doubt that the incidence of dysmenorrhœa can be markedly diminished. Moreover, apart from the pain and discomfort, the aggregate time lost by women workers, because of dysmenorrhœa, is enormous.

It is a common observation that, as a rule, those women who complain the most of their dysmenorrhœa have the least to think about, and conversely the pain is more easily tolerated by those who have to earn their own living.

Dysmenorrhœa may be divided into three classes :—

1. That in which the pain is intermittent and colicky in nature.

2. That in which the pain is continuous and dull-aching in character.

3. That in which, with a dull-aching pain, there are intermittent periods of sharp intensity. This class is a combination of the first two.

Moreover, in each of these three classes there may be some local disease to account for the pain, or this may be absent.

1. **Colicky Dysmenorrhœa.**—*Local Disease Present.*—The cause of the painful contractions of the uterus is due to some substance which it is endeavouring to expel, either blood-clot, mucous membrane, or a tumour.

When the flow is excessive, or when the cervical canal is narrowed, blood-clots collect in the uterus. In either case the blood does not escape as freely as it usually does. Clots are therefore formed, and the contractions of the uterus to expel them must necessarily be stronger than in normal menstruation when there are no clots. This effort of the uterus results in severe pain resembling colic, which lasts until the blood-clot is expelled. Any disease, therefore, in which menorrhagia is a symptom, or in which the cervical canal is narrowed, such as atresia of the cervix, a polypus, a cancer, or a fibroid, obstructing the cervical canal, may give rise to colicky dysmenorrhœa.

A reference to the description of normal menstruation will remind the reader that the mucous membrane is shed during this period in small pieces. In the disease known as *membranous dysmenorrhœa* the mucous membrane is so altered that it cannot break up into little pieces, but is detached either in large pieces, or even as a cast of the whole uterus, by the blood that has escaped from the

capillaries stripping up the membrane. To expel these large pieces the uterus has to contract strongly, hence the pain.

Lastly the presence of a polypus in the uterus impels this organ to contract vigorously in its endeavour to expel it, and these contractions are especially marked during menstruation.

Local Disease Absent.—In the majority of cases no adequate cause can be found for the uterine colic, and the condition is then known as *spasmodic dysmenorrhœa*. The pain in these cases has been thought to be due to a neurosis, but it is often present in women in whom such a diagnosis could not be entertained. In many cases the shape of the uterus has not changed with puberty, and corresponds to that found in the infant, so that it is markedly anteflexed, and its cervix has a pin-hole os and is conical in shape. It has been thought, therefore, that the pain may be due to this peculiarity, but such a shape is found very well marked in women with painless menstruation. It may be that some cases are due to a neurosis and others to a maldevelopment.

2. Congestive Dysmenorrhœa.—In all women the genital organs become congested during the week preceding the period as a result of the extra amount of blood which flows to them at that time. This blood is accommodated by the genital organs becoming somewhat stretched or distended, and so long as they are not the seat of any disease this congestion causes but little discomfort in most women.

Local Disease Present.—When the internal genital organs of a woman are in a state of chronic congestion or are inflamed, such as in cases of endometritis, salpingitis, pelvic peritonitis or pelvic cellulitis, or when tumours are present in the uterus, such as fibroids, adenomyoma, and cancer, or when there is displacement of this organ, the additional amount of blood causes increased pressure on the nerves and pain results. If, moreover, the uterus,

ovaries, or Fallopian tubes are bound down by adhesions, and unable to become distended or stretched with the congestion, pain also results.

Local Disease Absent.—Congestive dysmenorrhœa, in the absence of local disease, does occur in young people. It is impossible satisfactorily to account for the cause of the pain. It is probably due to the custom, in the past, of treating girls as semi-invalids while they are “unwell.” The curtailing of exercise, the provision of hot-water bottles, and so forth, merely increasing the normal congestion at this time.

3. Colicky and Congestive.—Many women who suffer from colicky dysmenorrhœa acquire, as time goes on, the congestive variety in addition. There is no need to discuss this third variety separately since its symptoms and signs are a combination of the first and second.

SYMPTOMS.—

The pain in a typical case of spasmodic dysmenorrhœa which appears a few hours before the menstrual flow commences and lasts, as a rule, not longer than twenty-four hours, is of a spasmodic character, although this is not necessarily so. In many instances menstruation for the first two or three years is painless, or only causes slight discomfort, though at times the pain is present from the commencement. Spasmodic dysmenorrhœa is the commonest form of dysmenorrhœa in young women, and also the most painful, so that the patient may vomit, perspire, or even faint. The flow does not become fully established until the pain ceases. As time goes on, if the condition is not cured, there is a tendency for the supervention of the congestive type so that the pain becomes more continuous and may last much longer.

From what has been said, as to the cause of congestive dysmenorrhœa, it might be supposed that the pain would appear sometimes before the menstrual flow and decrease as the period continued. This, as a fact, is the case, the

pain which is of a dull-aching character commencing perhaps five or six days before and disappearing or being relieved, towards the end of the period.

TREATMENT.—

The proper method of treating dysmenorrhœa is to ascertain, if possible, the cause, which may necessitate a pelvic examination, and then to treat it. A nurse cannot from her training be expected to arrive at such a diagnosis.

Many cases of spasmodic dysmenorrhœa are successfully treated by attention to the general health, many of the girls being anæmic and constipated and perhaps not taking sufficient exercise, and in these cases an internal examination is not necessary. If such measures fail dilatation of the cervix will in most cases effect a cure or at any rate greatly relieve the pain. The operation has this additional advantage, that if sterility is complained of it will, in a certain percentage of cases, cure that also.

The most usual drugs prescribed by the doctor are those of the coal-tar series, antipyrin, antikammia, aspirin, ammonol, phenacetin or pyramidon.

NURSING.—

The nurse may be of the greatest assistance in giving advice on the preventive treatment of dysmenorrhœa.

The following copy of the leaflet issued by the authority of the Council of the Medical Officers of Schools Associations, will give the nurse an idea on what lines her advice should be given. The carrying out of these Rules has reduced the incidence of dysmenorrhœa in Schools and Nursing Schools to a very marked extent:—

“Advice to Girls Concerning their Monthly Period.”

“1. The monthly period is not a malady but a natural function; you ought, therefore, at these times to feel quite well and to be free from pain or any unpleasant sensations.

“2. The ordinary rules of cleanliness and hygiene should be observed as at other times. There is no risk in the use of soap and water, in spite of the usual prejudice against it; a warm bath should, if possible, be taken every day throughout the period; if this is not possible, you should wash the whole body, including the feet, with soap and water. There should be a daily action of the bowels, as at other times.

“3. In order to grow up strong and well, it is necessary that you should have some exercise every day in the open air, such as a brisk walk or games. It is important that you should continue this exercise, as usual, throughout the period, as, by so doing, you will probably prevent the onset of monthly discomfort and pains later on. If you are troubled with slight headache or backache, or a sense of fatigue, or slight pain during the period, you should take a brisk walk or play games, or do some work in the house or garden involving bending movements of the body. If you give up all exercise, more especially if you lie down, your aches and pains will be prolonged and increased in severity.

“4. If you feel ill at the period and are not able to carry on your usual occupation, your doctor should be consulted. Any ailments associated with the period are more easily cured while you are young than after they have been established for years.”

The treatment of dysmenorrhœa by opium or hot gin and water, is absolutely to be condemned. The life of many a young girl has been ruined from the habit thus acquired, especially in the case of opium or its derivatives. Nurses particularly should be careful about this. It is a fact that in many of these cases the victim was, in the first instance, advised to take the opium by a nurse, or the nurse herself acquired the habit during her hospital training, more especially as in these circumstances it is a comparatively easy matter to get possession of this drug. The “Dangerous Drug Act” has reduced materially the number of such victims.

If the advice of a doctor cannot for the moment be obtained there is no harm in the nurse advising small doses of aspirin, antipyrin, hot ginger and water, or sal volatile in cases of spasmodic dysmenorrhœa not associated with the discharge of clots or a membrane. A hot-water bottle applied to the vulva, in which situation it gives far greater relief, if any, than if applied to the abdomen, and rest may be tried.

Congestive dysmenorrhœa in many cases is relieved by rest, warmth and saline aperients.

The doctor may wish to ascertain whether his patient is suffering from membranous dysmenorrhœa. In this case he will direct the nurse to save "everything that is passed," to enclose it in muslin and then to wash it in relays of water. The blood and blood-clots will thus be disposed of and any membrane present will be retained in the muslin for future examination.

If the dysmenorrhœa is really so bad that it cannot be controlled by the usual drugs or by such a simple operation as dilatation of the cervix some authorities, as a temporary relief, will order an opium suppository without enlightening the patient, but the only proper treatment is to stop menstruation for good. It need hardly be added that such a method of relief is only very rarely sanctioned by the doctor.

Intermenstrual Pain.

This is a condition in which women complain of pain, more or less severe, occurring quite regularly between the periods. This pain has no particular relation to menstruation either as regards its quantity or dysmenorrhœa. It is a fact, however, that of those who complain of this "middle" pain a majority perhaps suffer from dysmenorrhœa and some increase in loss. Again intermenstrual pain is more often a source of complaint by women who have had children. These two facts suggest that the pain may be due to some abnormal action of the ovary due to adhesions or inflammation following infection, and indeed one theory is that the

pain is due to the fact that the covering of the Graafian follicle (see p. 21) is much tougher, and therefore ovulation is accompanied by severe pain. This theory, however, will not hold good for those women who have never had children or in whom no local "trouble" can be detected. For these the second theory is advanced, namely, that the pain is due to the stretching of the Fallopian tube by secretion, the abdominal ostium being closed by a few adhesions, and disappearing when the retained fluid escapes into the uterus. Both these theories as to causation may be correct since, not infrequently the outer covering of the ovary is found to be very thick or to be covered with dense adhesions, or the Fallopian tube is found to be dilated (Hydrosalpinx).

TREATMENT.—

Patients complaining of intermenstrual pain should be examined by a doctor who, if any local cause is discovered, will be able to recommend the appropriate treatment.

Abdominal Pain.

The symptom of abdominal pain is far too wide a subject to be discussed at all fully, in such a book as this, arising as it does from so many causes, medical, surgical, gynæcological and obstetrical.

There are three varieties of pain of which women may complain and which may have some reference to the genital organs; they are acute, chronic and colicky.

Acute Pain.—

A sudden and really acute attack of abdominal pain in a woman is perhaps more frequently due to a ruptured total gestation or tubal abortion than any other cause. A very distinctive situation for the pain in such circumstances is in the shoulders and this disappears when the patient sits up. It is due to the irritation of the blood as it touches the diaphragm. An acute abdominal pain during labour is associated with tonic contraction of the uterus and concealed accidental hæmorrhage. An acute abdominal pain

in the loins in a pregnant woman may be due to pyelitis or pyelonephritis. This pain, which may be very intense, is accompanied by marked tenderness, and if on the right side it is often mistaken for appendicitis or more rarely for biliary colic. Other causes such as renal colic and acute pyosalpinx must be borne in mind. Again an epigastric pain, probably due to involvement of the liver, is complained of in pregnant women in danger of eclampsia, and a fibroid of the pregnant uterus may undergo red degeneration and be the seat of pain. Following labour, general peritonitis, pelvic peritonitis and pelvic cellulitis may give rise to severe pain, and lastly during or apart from pregnancy an ovarian tumour may undergo torsion causing great pain, as more rarely may a pedunculated sub-peritoneal fibroid. Infection of an ovarian cyst and a perforated gastric ulcer may also be mentioned as causes of abdominal pain.

Chronic Pain.—

The detection of the cause of a chronic pain or aching may be difficult. In the first place one has to "size up" the patient, as it were. Women will walk into the outpatient or doctor's consulting room and state that they are suffering "frightfully" and that the pain is "agonizing," "terrible," or "something shocking," and they are unable to stand any more. Their looks belie them. A similar type of woman, in other circumstances, will tell one that she has vomited every meal for the last two weeks and yet looks fairly well nourished. As a general rule the woman who describes her pains so graphically is also most intolerant of an internal examination, so that although the greatest care is used she will resist, cry out and declare that any movement of the uterus or palpation of the vagina and its fornices causes intense and intolerable pain. In but a very few of these cases can any cause be found. The victims are often run down, more or less anæmic, have usually too much work to do and too little rest and perhaps no holidays, while their diet may be insufficient or inappropriate; they are suffering from neurasthenia.

A dull-aching pain is associated with pelvic inflammation, and if, in addition, there is a history of repeated and acute attacks of abdominal pain lasting a day or two, such a diagnosis is almost certain, the acute attacks signifying a further involvement of the pelvic peritoneum. The pain of pelvic inflammation is relieved by lying down. Tumours of the pelvic organs, both innocent and malignant, do not, as a rule, cause pain except from pressure, unless if innocent they have become infected or bleeding has taken place into them, or if malignant the growth has extended beyond the tumour. The pain of malignant disease is not relieved by rest and is worse at night. Fibroid tumours of the uterus are painless, and if, therefore, a patient with such a tumour complains of pain or tenderness, or both, it signifies, as a rule, either that it has undergone degeneration or that cancer has become engrafted upon it. An over-full bladder from retention of urine is a source of extreme discomfort if not of real pain. A favourite diagnosis of the cause of pain in one or other iliac regions is that of "ovarian trouble." The only "ovarian" indication about it is that the pain is felt over the ovarian region. If the patient is submitted to operation it is very rare to find the ovaries diseased. It takes a long time to convince those women who imagine that their pain is ovarian in origin, or have been told so, if one can ever do so, that the pain is not due to this source. Such a pain is perhaps most often due to a loaded cæcum or sigmoid, and is cured by Epsom salts.

Colicky Pain.—

Intermittent abdominal pain of a severe nature is connected in gynæcological practice with threatened or inevitable miscarriage, extra-uterine gestation, or with the efforts of the uterus to expel a fibroid polypus. In all these conditions there is also some uterine bleeding.

The colicky pain of dysmenorrhœa has already been dealt with.

Backache and Pelvic Pain.

This variety of pain, which is of a bearing down and aching character, is generally attributed, and not necessarily by the laity, to some abnormal condition of the genital organs. This is quite a mistake and not infrequently leads to various methods of treatment, such as tampons, pessaries, massage and electricity which do no good and only lead to disappointment. It may be confidently stated that, as a rule, backache is not due to any abnormal condition of the genital organs. It is true that prolapse of the uterus does give rise to a bearing down pain and backache which is relieved by rest and by proper treatment. On the other hand, backward displacement of the uterus, which is always being blamed for backache, does not cause the least discomfort unless there is some other condition, such as a fibroid, subinvolution, pelvic inflammation, marked congestion or prolapsed ovaries super-added. If an ovary gets imprisoned below the retroverted uterus it will cause a dull-aching backache, and some women with very bad constipation complain also of a similar pain, but more on the left side. As regulation of the bowels cures such a pain it may be that the latter is due to pressure of the loaded rectum on the ovary. Malignant disease of the uterus and chronic pelvic inflammation may be the source of backache.

It is true that backache on rare occasions is due to some perfectly obvious, and at times very serious, disease. Example of this are spinal causes, such as malignant disease of the spine, osteo-arthritis, lateral curvature, tumours of the spinal cord and so on. There are, however, two causes of backache which may be more fully described, namely, fatigue backache and strain of the sacro-iliac joint.

Fatigue Backache.—This is due to muscular and nervous fatigue. It is of a dull-aching character and is made worse by exercise. This variety is found in women who have to stand or sit for many hours, the latter perhaps in the faulty position of bending over desks. In those who have to

carry heavy weights and in those who have to use the muscles of their spine continually to maintain a correct position, as is seen in the later months of pregnancy and in many women who wear high-heeled boots. It often happens that in addition to the faulty position the victims of fatigue backache are “run down” and anæmic.

Strain of the Sacro-Iliac Joint.—This is a common cause of backache which often remains unrecognized. The pain, which is worse at night and after exertion, is elicited by first flexing the thigh and then extending the leg and by grasping the iliac bones moving the joint. A firm bandage round the pelvis will relieve the pain.

Coccygodynia.

Two varieties due to neurasthenia or traumatism. The neurasthenic will fancy that there is something wrong with the “bottom of her spine” and will complain of intense pain in sitting down. A local examination fails to disclose any local affection. Traumatic coccygodynia following a blow, fall or difficult labour resulting in fracture of the coccyx is easy to diagnose. There is severe pain when the coccyx is palpated and this is found to be fractured, moreover, the history will complete the diagnosis.

Dyspareunia.

Dyspareunia signifies pain or difficulty in sexual congress. If the hymen is rigid and unruptured, if the cervix is abnormally long, reaching in some cases even as far as the vulval orifice, if the uterus is prolapsed so that the cervix fills the vaginal orifice, if the vulval orifice is too small or there is marked disproportion between the male and female, difficulty, and perhaps impossibility will result for purely mechanical reasons.

If, on the other hand, the hymen having been torn has become inflamed, if there is a sensitive urethral caruncle, if there is a retroflexed uterus which is tender on being touched, if the ovaries are prolapsed, or there are present

in the pelvis diseased Fallopian tubes or peritonitis, or if there are any ulcers or fissures in the neighbourhood of the vaginal orifice, then, although there is no mechanical obstruction, the pain elicited during the act is such that it cannot be accomplished.

The other causes of dyspareunia can be more fully discussed under the subject of sterility.

DIAGNOSIS AND TREATMENT OF PAIN.—

The diagnosis and treatment of the pains discussed, and in their various aspects, are subjects for the medical practitioner. Nurses, may, however, be expected never to forget that a very acute abdominal pain accompanied by a little loss is a common occurrence in extra-uterine gestation, and that a backache is most unlikely to be due to disease of the genital organs; while the midwife who did not think of tonic contraction of the uterus, or of concealed accidental hæmorrhage, if a woman in labour complained of intense abdominal pain, should seek some other sphere for her activities. Not that any well-trained midwife would be likely to wait for the advent of pain before diagnosing the likelihood, or certainty, of such complications.

STERILITY.

The causes of barrenness in women can often be determined and often cannot be determined. With regard to the latter, it is common knowledge that a marriage may prove sterile, and yet if the husband and wife are divorced and again marry the new unions may be fertile. It is obvious that in the case of the first marriage the spermatozoa and ova were not suited to each other, whereas in that of the second marriage they were suited. It is not possible to carry the matter farther than this, but with such knowledge the breeders of horses, cows, and other animals are, in many cases, able successfully to combat sterility in their stock by changing the sire.

The causes that can be determined are either associated with the male or with the female.

Male Sterility.

Sterility in the male may be due to—

1. Disease or removal of the testes.
2. To some condition of the urethra which prevents the semen being deposited in the vagina, such as a stricture or hypospadias.
3. The spermatozoa being dead, malformed or absent.
4. The mechanism of emission may be imperfect, the man may be incompetent.

Sterility in the male is more common than is generally recognized, some authorities stating that in at least 20 per cent. of sterile marriages the disability is on the side of the husband. Such knowledge is of great importance, for it is not an uncommon occurrence for a woman to be operated upon for sterility without any investigation being made with respect to her husband. Needless to say a woman should not be subjected to any operation having for its object the cure of sterility until it has been ascertained that her husband is competent and that his spermatozoa are normal.

Female Sterility.

The causes of sterility in the female may be divided into two groups, absolute and relative.

Absolute Sterility.—A woman cannot conceive in the absence of her ovaries, Fallopian tubes, uterus or vagina, either from malformation, operation or disease.

Relative Sterility.—This group comprises the majority of cases of barrenness in the female. By relative sterility is meant some condition interfering with the progress of the spermatozoon to the oocyte, or which diminishes the vitality of the spermatozoa, or interferes with the implantation and growth of the zygote.

This group can further be divided into two classes; the one in which some physical signs, indicating defect in the sexual organs, can be found, the other in which the latter appear to be normal.

Physical Defect Present.—Included in this class will be found disease of the Fallopian tubes, of the ovaries, of the uterus, and of the vagina, more particularly salpingitis, endometritis, chronic cervicitis, and vaginitis. Many women afflicted with a backward displacement of the uterus, or with a submucous fibroid, do not conceive until the uterus has been replaced or the fibroid removed. On the other hand, it must be admitted that a vast number of women, so circumstanced, have no difficulty in conceiving and give birth to healthy children. Dyspareunia may be a cause of sterility.

Physical Defect Absent.—Although a most careful examination may fail to discover any physical defect in the sexual organs, nevertheless there are certain symptoms associated with the sterility in this class which in some cases appear to have a distinct bearing on the disability. These are spasmodic dysmenorrhœa, vaginismus, deficiency of the sex-sense, and profluvium semenis.

Spasmodic Dysmenorrhœa is not uncommonly associated with sterility. It certainly is a fact that the operation of dilatation of the cervical canal, undertaken to cure the dysmenorrhœa, in many cases also cures the sterility, and even in the absence of menstrual pain such a dilatation not infrequently leads to conception. It is difficult to understand why this should be since the cervix may appear to be perfectly normal, and however small its canal, short of complete obstruction, it is always sufficiently large to allow of the easy passage of spermatozoa.

Vaginismus.—A spasmodic reflex contraction of the levatores ani, may be purely of nervous origin, but the pain and distress of attempted coitus may be so great that penetration is impossible. Division of these muscles will usually cure the complaint.

Deficiency of the Sex-sense is quite common in women who are sterile. It may be that in such cases the ovaries do not function naturally. Its presence, however, is not essential to conception, since women have become pregnant as the result of brutal rape or after connexion while un-

conscious. There are many instances on record, nevertheless, in which the only time the woman conceived was when she had her first and only orgasm.

Profluvium Semen, or expulsion of the semen immediately following coitus, occurs in a large number of women who are sterile. It is also a well-known phenomenon in sterile mares, and in the latter can at times be cured by injecting the semen directly into the uterus. In view of the millions of spermatozoa that are deposited in the vagina, it would seem impossible that all should be expelled, and the oocyte requires only one spermatozoon to fertilize it. The fact, however, that Nature provides such a vast number of spermatozoa to be available for the fertilization of one oocyte, rather points to the fact that it is not so easy for an oocyte to be fertilized as might be thought, and that, therefore, by the expulsion of a large portion of the semen the chances of fertilization become correspondingly lessened.

TREATMENT.—

The nurse will not be called upon often to advise as to the treatment of sterility since the treatment is based, as far as possible, on the cause, and this the doctor will have to determine.

There are, however, some cases in which no abnormality can be discovered either in the husband or wife, and in which certain procedures that the doctor will advise may be successful. The most common of these is dilatation of the cervix with or without curetting. Some authorities advocate the latter, believing that a new endometrium may favour the implantation of a fertilized ovum, this on the assumption that the cause of sterility is the failure of implantation, or as the medical student more tersely put it in his final examination, "a new tenant prefers a new wall paper." It is not known in what percentage of cases such a treatment is successful, but every gynæcologist has had many successes after dilatation of the cervix—and many failures. From this it is obvious that if the opinion of the

nurse was sought, as it not infrequently is, her answer would be that it is most certainly worth trying. Another method of treatment, in similar circumstances, is that of enlarging permanently, by a plastic operation, the external os and cervical canal (Pozzi's operation).

More recently other methods of treatment have arisen, about which nurses may be supposed to know something since the female portion of the laity, especially those wanting children, are now very busy talking about them, and several women are stated to have been highly delighted with the results !

These methods are the inflation of the Fallopian tubes with carbon-dioxide gas and the injection into the Fallopian tubes of an oily solution of iodine known as Lipiodol.

Inflation of the Fallopian Tubes.—

This method was originally devised as a means of ascertaining whether the Fallopian tubes (one or both) were patent. It is obvious that if the Fallopian tubes are blocked, as the result of infection, the oocyte cannot get into the tube to be fertilized. With a special instrument, the best pattern of which is that elaborated by Provis, carbon-dioxide gas is injected into the uterus and, certain precautions having been taken to prevent its leakage back into the vagina, it must, therefore, escape into the peritoneal cavity or distend the Fallopian tubes.

Which of these two events is happening is determined by hearing the gas escaping into the peritoneal cavity when the ear is applied to the abdomen or with a stethoscope, and also by an instrument called a manometer, attached to the bottle that is delivering the gas to the inflation tube. This manometer registers the pressure of the gas in the bottle and in the uterus and tubes. If the Fallopian tubes are patent the needle on the manometer rises steadily till it suddenly stops and commences to fall which is an indication that the gas is entering the peritoneal cavity. The pressure before this occurs varies from 40 mm. up to 200 mm. of mercury, as a rule somewhere about 120.

Pressures higher than 200, and even with 200 if the needle sinks very slowly, show that there is partial or absolute obstruction. The disadvantage of this method is that although it may determine an obstruction there is no indication as to where the obstruction is. Now it is very important that this should be known since most authorities are agreed that it is not worth while submitting the patient to an operation if the obstruction is near the uterine end of the tube or in the isthmus; on the other hand, if the obstruction is at the ampullary end, an operation may be well worth doing. When this method of inflation had been in use for some time it was discovered that a certain number of sterile women became pregnant after inflation, although their tubes had been found not to be patent. One authority claims to have had a 10 per cent. success of this kind. It must be supposed that in such cases there was a certain obstruction which was easily overcome by the pressure of the carbon-dioxide gas.

Injection of Lipiodol.—The injection of lipiodol having been used as a method of diagnosis for spinal tumours, it occurred to Forsdike¹ to employ it for diagnosing at what part of the Fallopian tube the obstruction was, if any. The lipiodol is injected into the uterus and directly afterwards the patient is X-rayed, and the outline of the uterine cavity and canal of the Fallopian tubes filled with lipiodol can be clearly seen on the screen and a radiogram can be taken. If the tubes are patent then some of the lipiodol will be found to have trickled into the peritoneal cavity. If there is an obstruction in the Fallopian tube or tubes, then the lipiodol will be held up at the point of obstruction which can be clearly detected. It is curious that just as inflation was first tried for diagnostic purposes and later was found to have a certain value in cases in which the Fallopian tubes were not patent, so it is with the injection of lipiodol. First used for diagnostic purposes, Forsdike now claims,

¹ "Sterility in Women, Diagnosis and Treatment," S. Forsdike, F.R.C.S. H. K. Lewis and Co.

after injection, a 34 per cent. of cures in sterile women with patent Fallopian tubes.

PREPARATION OF THE PATIENT.—

Both inflation with carbon dioxide, and injection with lipiodol are better done without an anæsthetic, if the patient does not mind the necessary exposure and manipulation, for this reason, that if there is an obstruction the patient will complain of pain, and this being so the pressure of the gas or the flow of lipiodol can be better regulated than if the patient was unconscious, in which case, unless great care is taken, an obstructed tube might be burst.

Inflation or injection must never be attempted if there is any pelvic inflammation or septic condition of the genital passages, or if the patient has serious disease of the heart or lungs.

The best time is about midway between the periods. The patient should have inserted into the vagina (or insert them herself) glycerine plugs for two days before the appointed time, which softens the cervix and makes it yield more easily, since it has to be dilated to insert the inflation tube or injection syringe. The night before the operation an aperient should be taken.

CHAPTER IX.

VAGINAL DISCHARGES.

UNDER this heading is included any discharge escaping from the vagina, other than normal menstrual discharge or an excess of blood. Such a discharge may be coming from the body or neck of the uterus, from the Fallopian tubes, vagina, bladder, rectum or peritoneal cavity. The Fallopian tubes, uterus, vagina and vulva are, in their normal states, responsible for a certain amount of discharge, while that from the uterus, vagina and vulva may, in such circumstances, as just before menstruation, during pregnancy or sexual stimulation, be excessive, without being pathological. It will be useful, therefore, first of all shortly to describe the normal discharges.

Fallopian Tube.—The mucous membrane of the Fallopian tube secretes a small quantity of watery fluid.

Body of the Uterus.—The glands of the corporeal mucous membrane secrete a small quantity of watery fluid.

Neck of the Uterus.—The glands of the cervical mucous membrane secrete a clear, transparent, viscid fluid, the amount of which varies in different individuals. Its characteristic appearance can only be seen with the aid of a speculum as it escapes through the external os. At the vulval orifice the secretion has lost its transparency and is yellowish and flaky from being mixed with the vaginal discharge.

Vagina.—There being no glands in the vagina the fluid portion of its secretion must be due to an oozing from its surface. Its white, at times yellowish-white, colour is due to the admixture with the epithelial cells which have been

shed from the vagina, after they have undergone fatty degeneration, to which also is due its flaky appearance.

Vulva.—The following secretions have their origin in the vulva. Watery from the sweat glands, oily from the sebaceous glands, glairy and transparent from Bartholin's glands and serous from Tyson's glands. Through the agency of one or more of these secretions the inner surfaces of the labia majora and the structures which they cover are kept moist. In women who are not as cleanly in their habits as they should be, the fatty degenerated epithelial cells are apt to collect as a yellowish granular material, especially in the neighbourhood of the clitoris and labia minora.

Any discharge therefore which has one or the other of these characteristics, and is not excessive, except in those temporary circumstances mentioned above, when the glands are in a hyperactive condition, must be looked upon as normal. The difficulty is to determine what quantity may be regarded as excessive. A good guide is whether the discharge is sufficient to soil the underwear unduly, or to necessitate the use of a diaper.

Abnormal vaginal discharges can be well classified according to their appearance.

Mucous.—To such a discharge is properly given the name of leucorrhœa or "the whites"; these terms are often incorrectly applied to all discharges which are not bloody, watery or fæcal in character.

An abnormal mucous discharge, otherwise than of a temporary nature, is a proof that the glands of the cervix are secreting an excessive quantity. Such a condition may be due to the fact that there are more glands to secrete, the best example of which is the subinvolution of the uterus, a condition in which this organ has not returned to its proper size or condition after labour. Most commonly, however, such a discharge is due to the fact that the cervical mucous membrane is inflamed. Such inflammation is more likely to occur as the result of infection during labour or

the puerperium, or in women who are not virgins; nevertheless, there are always septic organisms in the neighbourhood of the vulva and lower third of the vagina, and if for any reason the resistance of a virgin is lowered, these organisms may travel up the genital canal and infect the cervical mucous membrane. Chronic endocervicitis (inflammation of the cervical mucous membrane) often results in the appearance of an "erosion" in that part of the cervix which projects into the vagina.

Muco-purulent.—This is due to the inflammation of the cervical mucous membrane causing the formation of pus.

Pus.—Pus escaping from the vaginal orifice may have its origin in the Fallopian tube, ovary, uterus, vagina, pelvic peritoneum or cellular tissue. The commonest causes of a purulent discharge are acute vaginitis, or the irritation of a foreign body in the vagina, generally a neglected pessary. A purulent discharge from the uterus is due either to an acute infection generally following labour, miscarriage or gonorrhœa, or to the sloughing of a tumour in the uterus. A purulent discharge may also be due to the chronic infections known as senile vaginitis and senile endometritis.

Pus, arising in some other situation, may, as a result of ulceration, be discharged through the vagina, or more often through the rectum. Such conditions, therefore, as a pyosalpinx, ovarian abscess, a pelvic abscess due usually to infection *via* the Fallopian tube or perhaps to appendicitis, and an abscess in the pelvic cellular tissue, due to infection, the result of lacerations during childbirth or to operations or other injury, may be the origin of a purulent discharge from the vagina.

Water.—A watery discharge escaping from the vagina comes from the body of the uterus, bladder or ureter. Thus if there is more endometrium than normal owing to the increased size of the uterus from subinvolution or the presence of a tumour, the woman may complain of an excessive watery discharge. Inflammation of the endometrium, from any cause, when it becomes chronic may also give rise to the same complaint. If there is a hole between

the bladder and vagina, as the result of ulceration or injury, urine will escape into the vagina. Lastly, and unfortunately, it sometimes happens that during the operation of hysterectomy a ureter is severed, and the injury escapes notice, or the ureter is denuded of its blood supply and sloughs later. In such cases the cut or sloughed end of that part of the ureter which is attached to the kidneys may discharge urine into the pelvic cavity and this in time escapes through the abdominal wound. Just as often, however, the cut end becomes engrafted into the top of the vagina, in which case the urine, in due course, is discharged through that canal.

Watery Blood.—A watery discharge which is coloured with blood is most frequently due to carcinoma of the Fallopian tube, uterus or vagina. As cancer of the uterus is by far the commonest of these three, the discharge is generally due to such a cause. Rarely a watery blood discharge is due to mucous polypi of the uterus, and the complication of pregnancy known as hydatid or vesicular mole also gives rise to such a discharge.

Fæcal.—If there is a hole between the rectum and vagina fæces will escape *via* the latter canal. Such holes, may, as in the case of vesico-vaginal fistulæ, be due to injury during, or ulceration following, childbirth, or to ulceration from syphilis, tubercle, cancer, or to the pressure of a neglected pessary.

Offensive.—It is obvious that in many instances the discharges mentioned above may be offensive. As, however, the first thing about a discharge that may strike a nurse is its offensive odour, the description dealing with this attribute has been placed under a separate paragraph. A very good example of an offensive odour being the first thing to call the attention of a nurse that “something is seriously wrong” is that of an incomplete miscarriage. Some women pay but scant attention to miscarriages. In such a case the woman may not trouble to get any advice until she becomes seriously ill from septic infection. In such circumstances the nurse may notice the smell when going upstairs before

she enters the bedroom. The discharge due to an ulcerating carcinoma, sarcoma or fibroid is intensely offensive, and that due to the presence in the vagina of a foreign body, senile endometritis or senile vaginitis may be nearly as bad. Discharges contaminated with fæces or urine are easily recognized from their odour. Except in the cases of fæcal and urinous discharges, the smell is due to the action of saprophytic organisms in the dead tissue or in the secretions retained by the foreign body. A good example of such an action occurs in cases of incomplete miscarriage.

The importance of a vaginal discharge depends on its character and on the age and civil state (married or single) of the patient.

From Infancy to Puberty.—Before puberty the vagina, uterus and Fallopian tubes, being undeveloped, are very rarely the seat of disease. In most instances, therefore, under this heading the discharge flows from the vulva, and may be associated with anæmia, debility, threadworms, dirt, or due to injury or gonorrhœa. Rarely the vagina may be at fault, in which case the discharge is due to inflammation caused by gonorrhœa, or some acute fever. Foreign bodies which have been inserted into the vagina by the child, such as hairpins, pebbles, fruit-stones, may also be a cause.

In a large number of instances no apparent cause can be found for the discharge.

Gonorrhœa may be due to assault, or it may be caused by infection from towels or bed-pans which have been soiled by some adult suffering from this disease. There are on record several outbreaks of this disease which has been spread in this way in institutions for girls.

It is also well to remember that mothers are wont at times falsely to accuse men of assaulting their daughters, because the latter are suffering from leucorrhœa.

From Puberty to Marriage.—From puberty onwards a number of females suffer from leucorrhœa a day or two before, or a day or two after menstruation. This is due to

congestion of the uterus, and is so common that it may almost be accounted as normal.

Other causes may be anæmia, chlorosis, constipation; diabetes; tumours of the genital organs; misplacement of the uterus; erosion of the neck of the uterus; endometritis; foreign bodies in the vagina; or a chill giving rise to congestion.

By far the commonest causes in young women are subinvolution of the uterus and vagina; misplacements of the uterus and vagina; septic infection, or puerperal fever as it is termed. It may also be due to gonorrhœa.

The term subinvolution of the uterus means that this organ has not returned to its normal condition and proper size after the birth of the child. As a rule six to eight weeks are required for complete involution to take place, and when this does not occur, the increased area of mucous membrane accounts for the leucorrhœa.

In misplacement the discharge is due to congestion and the increased size of the organ, or to ulceration of the vagina and neck of the uterus, should they protrude outside the vulva.

In puerperal fever microbes gain access to the genital tract, and set up inflammatory changes, which may become chronic.

In gonorrhœa the discharge, which is profuse and yellow or green, is composed of pus, and is due to the acute inflammation.

It must be remembered that cancer, fibroids and erosions are much commoner in married women.

After the Menopause.—In addition to many of the conditions mentioned above, leucorrhœa at this age may be due to inflammatory conditions of the uterus and vagina known as senile endometritis and senile vaginitis.

It is, however, most important to remember that the menopause is the commonest time for malignant disease of the genital organs to appear, and that, although a discharge of blood is generally the first symptom of such a

disease, nevertheless, any woman who at this time of life is suffering from a leucorrhœal discharge should consult a doctor, since very rarely it is this discharge which first appears.

SYMPTOMS AND SIGNS.—

From the nurse's point of view there is but little to be said concerning the diagnosis of the source of the discharge. There is a symptom, however, known as *pruritus vulvæ*, which is directly due to the contamination of the vulva with the discharge, although it may occur independently of it; a short account of which, therefore, will be appended. Obviously a nurse can be of assistance to the doctor by telling him what sort of discharge the patient has, if a specimen has not been saved, and there will be no difficulty in deciding whether a discharge is mucous, purulent, contaminated with blood or fæces and whether it is offensive. In the case of watery discharges, however, the doctor may want to know particularly whether this discharge is urine. A provisional diagnosis can be arrived at if the patient is recovering from a total hysterectomy, if she has just had a very difficult labour or if the nurse is attending a patient with cancer of the uterus or vagina, because in such circumstances she will know that a urinous discharge may follow. In the case of childbirth such a discharge may appear at once, due to tearing of the vaginal wall and bladder from the use of the forceps, or a few days later due to ulceration of these walls following serious and prolonged pressure of the foetal head. Apart from its smell, urine may be detected by soaking a piece of blue litmus paper in the discharge, which will then turn red.

TREATMENT.—

The treatment which varies with the cause comes under the province of the doctor. It may include some form of vaginal douching, and the nurse may be directed to carry this out (see page 268).

NURSING.—

As the discharge is in many cases irritating to the vulva the nurse can usefully smear the parts with vaseline, or better still, with a mixture of castor oil and zinc ointment in equal proportions. With offensive discharges, as with others, the nurse will carry out the treatment, perhaps douching, ordered by the doctor, and offensive discharges particularly will require a change of diapers and draw-sheets whenever they are soiled. Pessaries are not so frequently used as formerly, but a nurse, if she has the opportunity, must be careful to impress on a woman wearing one the great importance of a daily douche to keep the instrument clean, and of having the instrument changed by a doctor every three months.

Many women suffering from a vaginal discharge due to chronic endocervicitis, are obsessed with the idea that this is doing them a great deal of harm and that their strength is being drained away. Such women are constantly seeking advice or trying one or other remedy. If the condition causing the discharge cannot be cured by local applications or by some operation (and indeed in slight cases such procedures may be entirely unwarranted), and the discharge is troublesome because of the soiling of the underlinen or having to wear a diaper, an absorbent wool tampon inserted into the vagina in the morning and removed at night will be all that is necessary, and the patient may be assured that her health is not being affected.

PRURITUS VULVÆ.

Pruritus vulvæ, which is characterized by severe itching of the vulva, is a very distressing complaint. It may be present without any known cause, or it may be secondary to some local condition.

Primary Pruritus Vulvæ.—

Primary pruritus vulvæ is due to a neurosis.

Secondary Pruritus Vulvæ.—**CAUSES.—**

1. Congestion.

2. Irritation.

1. *Congestion* of the vulva may be due to pregnancy, to the extra flow of blood to the parts during the few days preceding menstruation, or to the menopause. It also may be due to pressure on the veins of the pelvis by ovarian and fibroid tumours.

2. *Irritation.* The vulval skin may be irritated by pediculi pubis and scabies; by a discharge, as in the case of patients suffering from cystitis, diabetes or leucorrhœa, and by eczema, herpes and leukoplakia.

SYMPTOMS.—

The itching may be paroxysmal in character, or more or less constant. It is generally worse at night or after exercise, when the patient is warm. It tends to become gradually more troublesome, and the scratching, which the sufferer finds necessary for her relief, only makes matters worse, by causing an eczematous condition of the vulva.

The irritation may become so intolerable that the patient will shun all society and even keep to one room, while there are cases on record in which the patient became insane and committed suicide, apparently from the great distress and loss of sleep occasioned by the constant irritation.

SIGNS.—

The urine of every woman complaining of pruritus vulvæ should always be examined for sugar in case this is the irritating agent. Diabetes is especially common in younger people while the other causes mentioned are not nearly so common. In some cases then, the nurse may easily arrive at a correct diagnosis. The comparatively rare disease known as leukoplakia of the vulva (see page 213), when well marked, may be diagnosed by a nurse who knows her

work. It is most important that it should be diagnosed at the earliest opportunity as it is probably an antecedent condition to carcinoma of the vulva, and its proper treatment may anticipate the advent of this terrible condition.

TREATMENT.—

In most cases if a cause can be found, the appropriate treatment will give very satisfactory results. In pruritus due to the menopause, old age or neurosis, however, in which no cause can be discovered, the effect of treatment is often most disappointing. X-Rays at times give relief and in some cases even excision of the whole or portion of the vulva has been found necessary.

NURSING.—

The local applications to prevent the vulva being contaminated, and within the reach of the nurse, have already been mentioned. Strict cleanliness will in many cases be very beneficial.

CHAPTER X.

DISPLACEMENTS OF THE UTERUS AND THE USE OF PESSARIES.

THE vagina, uterus, Fallopian tubes and ovaries may be displaced downwards. They are then said to be *prolapsed*. The uterus may also be displaced in other directions, thus it may be turned back, bent back, or turned forwards (Fig. 16). These various displacements may be combined. Prolapse of the anterior vaginal wall is generally associated with prolapse of part of the bladder and the resulting swelling is known as a *cystocele*. Similarly part of the rectum may be associated with prolapse of the posterior vaginal wall, the swelling being called a *rectocele*.

The nurse should again read over the sections and pages describing the structures that keep the pelvic organs in their natural position; she will then easily realize why in certain circumstances they should become displaced.

The Uterus.—

Backward Displacement.—

If the uterus is displaced so that its neck looks forward towards the bladder and its body backward towards the sacrum the condition is known as *retroversion*. If the body of the uterus is bent backwards and its neck is looking in its normal direction towards the sacrum, the condition is known as *retroflexion*. In most cases of backward displacement the retroversion and retroflexion are combined, so that while the body is bent back at the neck, nevertheless the neck is directed somewhat forwards. These two varieties, therefore, will be described as a whole.

CAUSES.—

1. Congenital.
2. Pregnancy, Labour and Puerperium.
3. Tumours.
4. Pelvic peritonitis.

1. *Congenital*.—In a large number of women who have not given birth to a child, and in whom there is no evidence

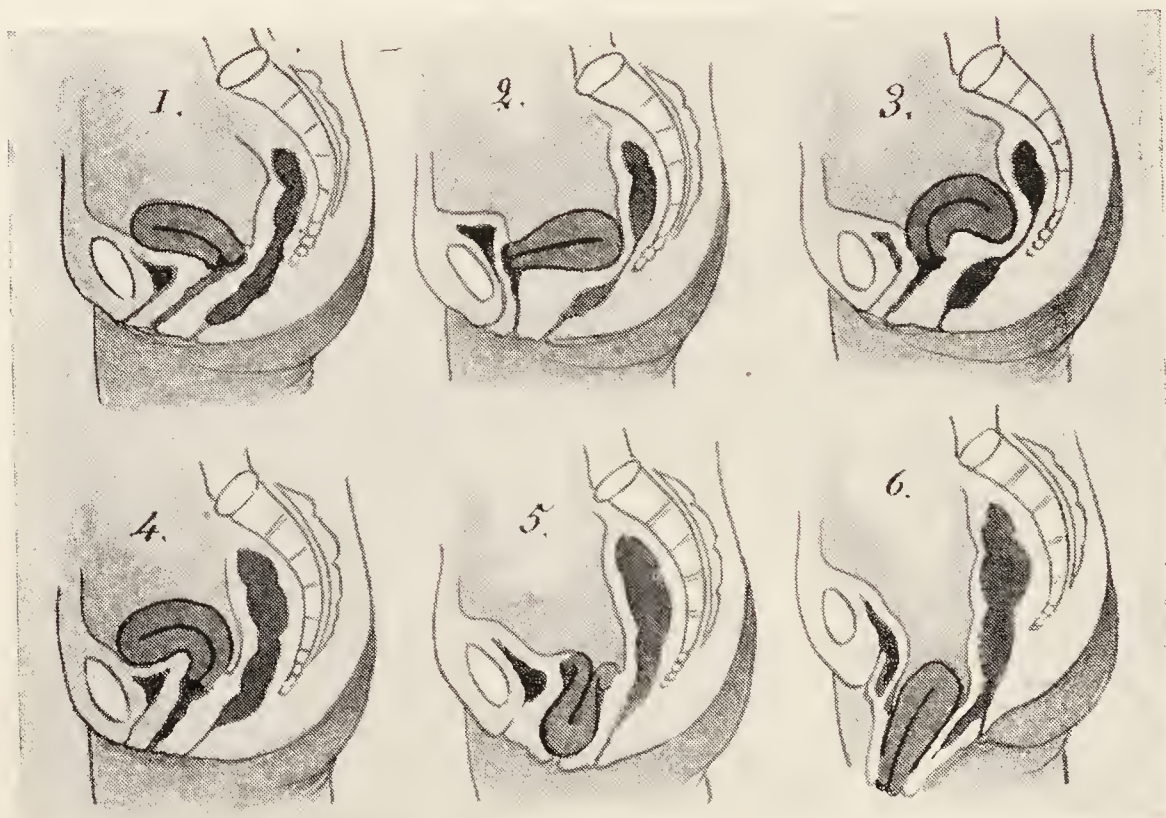


FIG. 16.—Position of the uterus. 1. Normal; 2. Retroversion; 3. Retroflexion; 4. Anteversion; 5. Inversion; 6. Prolapse, also prolapse of the vaginal walls.

of a tumour or of pelvic peritonitis, the uterus is found to be displaced backwards. It is fair, therefore, to assume that in such cases the displacement may be of congenital origin or, at anyrate, to a malformation during the development of the uterus between birth and puberty.

2. *Pregnancy, Labour and Puerperium*.—The commonest cause of backward displacement of the uterus is due to the fact that the woman has given birth to one or more children. The reason why this should be so is not difficult to under-

stand. Directly after a miscarriage, or a full-time labour, the uterus is much heavier than before, in the latter case two pounds instead of two ounces. It is often soft, its ligaments have increased in length, and the pelvic floor may have been unduly stretched or torn. If, then, after a miscarriage or labour, the woman lies on her back, the heavy, soft and very movable uterus falls back on to the sacrum. If she is encouraged to assume such a position as the proper one, or is not warned against so doing, the uterus, as it decreases in size, sinks below the sacral promontory, and the small intestines, through the intra-abdominal pressure, still further prevent the uterus from regaining its correct position. After the pregnant uterus has got rid of its contents certain processes take place in it, known as involution, the result of which is that this organ then returns to the position and condition which is normal to the unimpregnated woman. The circulation in the uterus that is displaced backwards is not so satisfactory as it should be, and so the organ becomes congested. The process of involution does not continue so well in a congested uterus and the muscle thereof, instead of becoming firm, remains soft. When the woman gets up the uterus might be expected to tilt forwards, but as it is already being held back by the pressure of the small intestines, there is no encouragement for it to do so, and as a fact it very often remains where it is and is kept there indefinitely. Lastly, owing to the fact that the muscle remains soft it can easily bend on itself, and so, in addition to the version, flexion results.

Retroverted Gravid Uterus.—Such a condition is in nearly every case due to the fact that the uterus was retroverted before it became gravid.

In the case of pregnancy in a uterus already retroverted, as the ovum grows one of the following things will happen:—

The uterus by its expansion will escape from underneath the sacral promontory and the pregnancy will continue. This is perhaps the commonest termination.

The uterus will empty itself. This is probably one of the commonest causes of miscarriage.

The uterus at the twelfth week becomes incarcerated. Following this it may pouch and most of the foetus escape into the pouch which projects into the abdominal cavity. More frequently, the patient miscarries. If, however, she does not and the case is neglected, cystitis develops, the inflammation may spread along the ureters to the kidneys and may cause the death of the patient. On occasions the bladder has been known to burst, because of the weakening of its wall due to ulceration.

Rarely retroversion may follow a sharp blow or fall in a woman some twelve weeks pregnant in whom a full bladder has pushed the uterus back to a horizontal position. In this case the increased intra-abdominal pressure, applied to the top or anterior surface of the uterus, forces it back below the promontory of the sacrum which imprisons it.

3. *Tumours*.—The weight of a fibroid tumour in the anterior or posterior wall of the uterus may cause it to fall backwards. Likewise an ovarian tumour pressing on its anterior surface will do the same. These are rare causes.

4. *Pelvic Peritonitis*.—As the result of this disease adhesions form. These adhesions in time contract, and if they are attached to the back of the uterus they may pull it back and fix it. It is a fact that the uterus is often found retroverted and fixed in cases of pelvic peritonitis and salpingitis. Whether the uterus was in a normal position before the advent of these diseases is a question. More probably it was displaced backward, and the adhesions forming fixed it there.

SYMPTOMS.—

These depend on the cause of the displacement. Thus in congenital cases they are usually absent. Following miscarriage or labour, the usual symptoms, if any, are menorrhagia, discharge and backache due to subinvolution of

the uterus and perhaps a resulting chronic endometritis. The symptoms and signs associated with a retroverted gravid uterus are those of miscarriage or incarceration. The symptoms of incarceration, as a rule, come on slowly and are striking, since together with those of a twelve

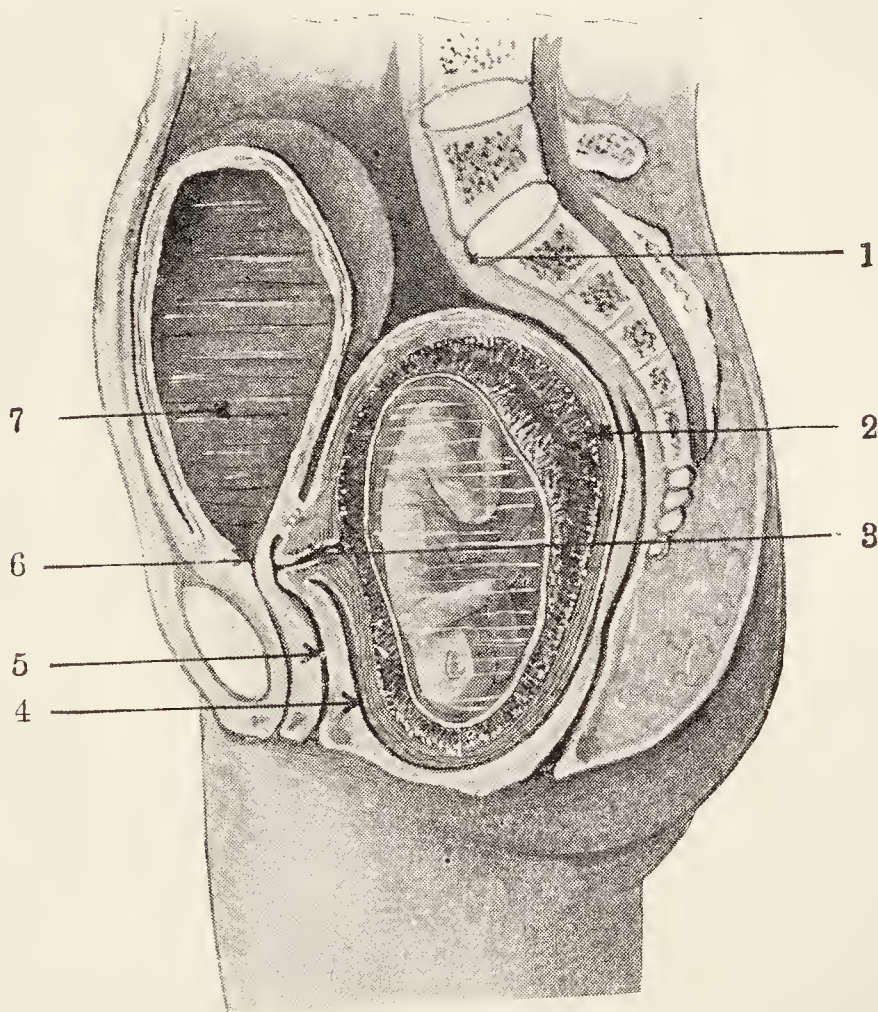


FIG. 17.—Incarceration of the retroverted gravid uterus. Body of woman divided in half showing the body of the uterus imprisoned below the promontory of the sacrum and the neck of the uterus directed forwards and upwards, so stretching the vagina and pressing against the neck of the bladder, thus causing retention of urine. 1. Promontory of sacrum; 2. Body of uterus; 3. Neck of uterus; 4. Vagina; 5. Urethra; 6. Junction of urethra with bladder; 7. Bladder.

weeks' pregnancy, there will be some serious trouble with micturition. Such a woman may first seek the advice of a doctor because she has retention of urine or great frequency in passing water. The retention is due to the fact that the neck of the uterus, which is looking forward, as a result of

the increased size of the body of the uterus, is driven farther forwards and upwards until it stretches the anterior vaginal wall so much that the urethra, which is attached to it, is very stretched and its canal is obstructed. The pressure of the urethra at its junction with the bladder may also assist in the obstruction (Fig. 17).

The obstruction may not be absolute, with the result that when the tension of the bladder, due to the retained urine, is raised to a certain point a small quantity of urine escapes past the obstruction, the pressure then falling no more escapes and so on. In this case the woman complains of frequency of micturition, the amount passed being small in quantity, a condition known as the *incontinence of retention*.

In the acute cases the patient will complain of some abdominal pain.

The symptoms of retroversion due to tumours and pelvic inflammation are those of their respective causes.

SIGNS.—

For the most part these will be recognized by the doctor. In a patient suffering from retention of urine due to incarceration of the uterus, however, the nurse has the early symptoms and signs of pregnancy to help her, and, in addition, the distended bladder forms a well-marked abdominal tumour, which is central, soft and fluctuating, and pressure thereon causes a desire to micturate. In most cases of retention of urine due to incarceration of the uterus an average of 5 pints of urine will be drawn off by the catheter. As many as 10 pints have been evacuated.

TREATMENT.—

The most important point of treatment, of a backward displacement of the uterus, is that of prophylaxis. Thus after labour, or miscarriage, patients should not lie on their backs for any length of time. Before the doctor finishes his attendance he should make a vaginal examination, and if he finds the uterus displaced backwards he should insert

a pessary which will keep the uterus more or less in its normal position. After a few months, when the uterine muscle has become firm, the pessary can be removed and the patient is cured.

Doctors, however, do not always have the opportunity here mentioned and may only see the patient later. If the displacement is found accidentally, that is in the course of an examination for some complaint that has nothing to do with the retroversion, no treatment is required, as also in the case of congenital displacements. If, however, the displacement is giving rise to symptoms the condition found on examination will be treated. If the displacement is not due to a tumour or pelvic inflammation and a pessary will give relief, the patient may be satisfied therewith. An alternative treatment is an operation for shortening the round ligaments, by which means the uterus will be pulled forwards and fixed in its normal position, perhaps after a preliminary curetting for the chronic endometritis. In the case of a retroverted gravid uterus, the doctor will replace it and insert a pessary, which the patient will wear till the fifth month, that is until it is impossible for the uterus again to fall back and become incarcerated.

If the gravid uterus is incarcerated, the doctor will endeavour to right the uterus and then insert a ring pessary. If he fails to correct the position of the uterus he will still insert a ring pessary, because it has been found that its continuous pressure will, in nearly every case, in due course rectify the malposition. Meanwhile retention of urine must be prevented by regular catheterization under the strictest aseptic precautions.

If the pessary fails the doctor will decide whether to empty the uterus or put it straight by an abdominal operation.

NURSING.—

The nurse should advise a woman who has had a child or a miscarriage and who complains of menorrhagia, discharge and backache to consult a doctor. She may also have the

opportunity of giving advice if the patient has had a pessary inserted. It is not difficult for a nurse to diagnose the distension of the bladder in a case of incarceration of the retroverted gravid uterus, and the passage of a catheter will not only relieve the patient but confirm the suspicion of the nurse.

Prolapse of the Uterus.—

CAUSES.—

1. Injury to the pelvic floor.
2. Increased intra-abdominal pressure.
3. Ill-health.
4. Congenital.

1. *Injury to the Pelvic Floor.*—By far the commonest cause of prolapse of the uterus is injury to the pelvic floor during childbirth. If the uterus does not involute properly it is heavier, and this is an additional factor in the displacement, as is the fact that the ligaments are longer than usual. The uterus cannot fall through the opening in the pelvic floor in which it is inserted without dragging with it the walls of the vagina and the bladder, the base of which is attached to the anterior vaginal wall. It is obvious that there must be various degrees of “falling of the womb” according to the distance it has sunk. If the condition remains untreated it is only a matter of time before the whole of the uterus is outside the vulval orifice dragging with it the walls of the vagina which are thus inverted. Such a complete prolapse is called *procidencia*. The uterus, however, cannot sink very far through the hole in the pelvic floor unless it becomes retroverted, the axis of the vaginal canal being downwards and forwards.

2. *Increased Abdominal Pressure.*—The weight of some tumour, the repeated and violent effects of coughing in chronic bronchitis, strenuous work of a bearing-down character, or the accumulation of fluid in the abdomen may force the uterus downwards by causing it to stretch the hole in the pelvic floor. These are rare causes.

3. *Ill-health*.—Another rare cause is chronic ill-health of the individual increased by under-feeding and hard work, in which case the uterine supports become loose and allow the uterus to sink.

4. *Congenital*.—Found in young women who have never been pregnant, and whose health otherwise appears satisfactory. Very rare.

SYMPTOMS AND SIGNS.—

These depend a good deal on the cause. It is only necessary here to discuss those of the commonest variety due to injury of the pelvic floor. Such women will complain of backache, some trouble with micturition, the feeling of a lump at the vaginal orifice, which may be a cause of discomfort on walking or sitting down. If there is subinvolution in addition there may be menorrhagia and a discharge. In cases of procidentia the inverted vaginal walls and the cervix may be injured by friction against the clothes, the ulceration therefrom causing a blood-stained discharge. Micturition may be frequent, due to irritation of the mucous membrane of the bladder by urine which cannot escape because of a cystocele. If the cystocele is very marked the woman may be unable to empty her bladder without pressing up the “lump.”

It is very doubtful whether a retroverted uterus *per se*, that is, one not markedly enlarged by a tumour or subinvolution, can cause frequency of micturition by pressure of its neck against the bladder.

The signs depend on the severity of the prolapse. At first a swelling will be noticed protruding through the vaginal orifice, especially when the patient strains. This swelling is either the anterior or posterior vaginal wall or both, dragging with them part of the bladder and rectal walls. When the condition is more advanced the neck of the womb can be identified outside the vulva, and on it and on the vaginal walls there may be ulcers.

TREATMENT.—

In many cases some form of pessary will suffice to keep the uterus and vaginal walls in position. Many women refuse to put up with the trouble associated with the wearing of a pessary, or it fails in its object and a plastic operation (in such cases anterior and posterior colporrhaphy and suspension of the uterus) is necessary, and in all except old women, or in women who are suffering from some disease or condition making an operation inadvisable, this is the best treatment.

Anteversion.—**CAUSES.—**

1. Lax abdominal walls.
2. Contracted pelvis.

1. *Lax Abdominal Walls.*—In some women who have lax abdominal walls, and especially, therefore, in the case of a woman who has had children, the gravid uterus falls forwards to an abnormal extent.

2. *Contracted Pelvis.*—Anteversion is encouraged if the pelvis is contracted at its brim and the head of the child cannot enter therein.

SYMPTOMS AND SIGNS.—

Abnormal anteversion of the pregnant uterus may give rise to a good deal of discomfort, and moreover, apart from any contraction of the pelvis, may when labour ensues lead to delay in labour, as the head will meet with difficulty in entering the brim and so perhaps become displaced.

TREATMENT.—

A doctor will examine the patient with a view to ascertaining whether there is a contraction of the pelvis and, apart from the treatment required in such a case, will order an abdominal belt to be worn to prevent the uterus falling forwards.

Inversion.—

1. Childbirth. Acute inversion.
2. Tumours. Chronic inversion.

1. *Childbirth*.—If, in the third stage of labour and in the interval of a pain, the top of the uterus is pulled upon or pushed upon it is likely to dimple. The small portion which is thus inverted is treated as a foreign body by the rest of the organ and is expelled through the vaginal canal and perhaps through the vulval orifice.

The top of the uterus can be pulled upon, if the placenta is still attached to it, by the weight of the child if the woman is in an upright position at its birth (precipitate labour), if the umbilical cord is so short (either actual or relative, being wound round the neck) that the progress of the child is hindered, or if a careless and ignorant midwife or nurse pulls upon it to deliver the placenta.

The top of the uterus is pushed upon, if the woman sits up to defæcate or micturate just after labour, or when the attendant squeezes it and forces it downwards in an endeavour to express the placenta. Probably no harm will result in any of these circumstances, if the uterus is contracting.

2. *Tumour*.—Rarely a fibroid tumour or cancer situated at the top of the uterus will cause the latter to dimple and give rise to a certain amount of inversion.

SYMPTOMS AND SIGNS.—

In most cases of acute inversion the woman is seized with great pain and there is severe post-partum hæmorrhage. If the inversion is complete, the whole of the uterus being turned inside out, a red bleeding lump will be seen protruding through the vulval orifice with the placenta attached to it or not, as the case may be, and the uterus cannot be felt on abdominal examination. If the inversion is incomplete a swelling will be found on vaginal examination, and in a case easy of examination a dimpling will be felt at the top of the uterus *per abdomen*. Rarely when the inversion is incomplete it does not give rise to any alarming symptoms, passes unnoticed, and becomes chronic.

The symptoms of chronic inversion of the uterus are those of bleeding, discharge, and pain, which a woman may put up with for a year or more before seeking advice.

TREATMENT.—

As two-thirds of the patients suffering from acute inversion die within a short time unless treated, a doctor if not in attendance must at once be summoned, and meanwhile the nurse must do her best, if the patient is bleeding, to reinvert the uterus. This she does by taking hold of the inverted body of the uterus, squeezing the blood out of it, and then gently pushing it back, the highest part, namely that which came down last, being put back first, and so on. If the placenta is attached it should not be interfered with unless it is nearly separated when it should first be removed. After the uterus has been replaced the patient should be given a hot antiseptic douche and ergot, to encourage the uterus to retract and to wash away any microbes, and in addition stimulants to combat the severe shock. If there is no bleeding and the patient is suffering only from shock, the nurse should not interfere and should await the arrival of the doctor.

In the chronic variety, due to childbirth, the doctor will probably be able to reinvert the uterus with the aid of an Aveling's repositor. This is a painful process, and the patient will have to be kept under the influence of morphia. Failing this some operative procedure will be necessary. When the inversion is due to a tumour the treatment will be directed towards it and not to the inversion.

USE OF PESSARIES.

The modern treatment of displacement of the uterus and vagina inclines less and less to the use of pessaries. Young women, knowing that they can be cured by operation, wisely select this method of treatment, rather than put up with the inconvenience and expense associated with the use of such instruments and retaining their disability to the end of their lives. In a certain number of patients pessaries fail to correct the misplacement or cannot be retained in the vagina. In others a pessary cannot be tolerated, its presence causes a septic

discharge and at times ulceration. The results of the modern operations for displacement of the uterus and vagina are so successful that the gynæcologist has no hesitation in recommending them. Some authorities contend that all pessaries should be burnt or put in museums. Such statements, however, are absurd, since there is no doubt that in selected cases, pessaries not only relieve the patient but their use is particularly indicated, when the age or state of health of the patient contra-indicates an operation.

Pessaries are used to prop up the uterus and vaginal walls when they are prolapsed; to support prolapsed ovaries and to keep a backwardly displaced uterus in the normal position.

Prolapse of the Uterus and Vaginal Walls.—The pessaries used for these conditions are known as the ring pessary and Napier's cup and stem pessary. The ring pessary consists of several watch springs bound together and covered with india-rubber. Ring pessaries vary in size and the doctor decides which to use by experience. There should be just room for the tip of the index finger between the front of the pessary and the back of the symphysis pubis.

In many cases such an instrument is sufficient to give relief and the patient is satisfied. If, however, the perineal body is deficient a ring pessary may slip out on defæcation or micturition. The ring pessary is also used with much success in cases of retroverted gravid uterus when the doctor cannot replace this organ manually. In these circumstances, if such an instrument is left in the vagina for two or three days, the pregnant uterus will be found to have righted itself. When the perineum is deficient, and in elderly women, or in women in a bad state of health, in whom an operation is contra-indicated, if a ring pessary will not stay in position, a Napier's india-rubber cup and stem pessary acts very well. The disadvantage of this instrument is that it necessitates the use of a waistband, between which and the stem of the pessary are attached four pieces of india-rubber and tape, these by their tension keeping the pessary in position. Moreover, a Napier's

pessary has to be removed every night and reinserted every morning, which is a good thing as far as cleanliness goes, but is a constant source of trouble to the patient.

Prolapse of the Vaginal Walls—Cystocele, Rectocele.—This misplacement can easily be cured by operation. If a patient does not wish to be cured of such a condition, a ring pessary will generally afford relief.

Prolapsed Ovaries.—The ovaries may be prolapsed, with or without displacement of the uterus, and will then rest in the pouch of Douglas, at times being nipped between the back of the uterus and the posterior vaginal wall. In some women such a position causes no trouble, others complain bitterly, of a dragging pain, of dyspareunia, or of pain in the left side when the bowels act, due to the scybala pressing against the ovary on their passage through the rectum. Such misplacements can easily be remedied by an operation, but, apart from this, the insertion of a ring pessary will result in the ovaries being better supported, and many patients are satisfied with the relief thus obtained.

Backward Displacement of the Uterus.—If such a displacement is not causing any symptoms, and is discovered during a routine examination of the patient, it does not require any treatment, operative or instrumental. In some cases, however, a backwardly displaced uterus certainly causes menorrhagia, backache, dysmenorrhœa, dyspareunia, one or more of these, and is at times the cause of sterility. Backward displacement can be cured by operation. If, however, the patient does not wish for such treatment, a pessary may and often does relieve her. There are two varieties of pessaries used for backward displacement, a ring and a Hodge pessary, the choice depending upon the particular variety of displacement and the relief obtained.

If the uterus is retroverted only, a Hodge pessary will tilt the body forward by pulling back the neck.

If the uterus is retroflexed only, it shows that the muscle at the junction of its body and neck is soft. In such a case a Hodge pessary is contra-indicated, since when it drags back the neck, the body does not tilt forwards and the con-

dition is made worse. All that can be done in such circumstances, as regards pessary treatment, is to insert a ring pessary which, by holding up the uterus, relieves to some extent the congestion, and the symptoms being improved the patient is satisfied.

If, as is generally the case, the displacement is a combination of retroversion and retroflexion, it shows that softening is present. In some cases this softening is not sufficient to prevent the body being tilted forward by a pessary, in other cases it is. In the first place a Hodge pessary may give relief, in the second a ring pessary will have to be used. The suitable pattern can only be ascertained by trying each variety of pessary and ascertaining which gives the most relief.

THE CARE OF PESSARIES.

Every woman who has had a ring or Hodge pessary inserted into her vagina should be warned that she must use an antiseptic douche daily, and go to a doctor every three months to have it taken out, cleansed and replaced or changed. If this is not done the secretions of the uterus and vagina will collect round the pessary and, becoming infected, will cause inflammation of the vagina resulting in a discharge, perhaps of an offensive nature. Moreover, if a pessary is left too long in the vagina it may cause ulceration of the vaginal walls, which ulceration may extend into the bladder or rectum.

The care of a Napier's pessary has already been described. If a pessary is fitting properly the woman should not be aware of its presence. If, therefore, a woman complains that her pessary is hurting her, the nurse should advise her at once to consult her doctor. Sometimes the pain or discomfort is due to pressure which may lead to ulceration, or the back part of the pessary may be nipping an ovary.

If a woman is wearing a pessary and becomes pregnant she should have it removed by a doctor during the fifth

month by which time there will be no danger of the uterus falling back and becoming incarcerated.

There are many shapes of pessary, but the three mentioned are those most frequently employed: they are



FIG. 18.—Method of holding the pessary before insertion. It is squeezed between the index finger and thumb.



FIG. 19.—Inserting the pessary through the vulvar orifice.

sterilized by insertion in boiling water for a minute or two, or by immersion in an antiseptic.

Insertion of a Pessary (see Figs. 18-21).—It is the duty of the doctor to insert a pessary, and it can only be on very rare occasions that a nurse is called upon to do so. There

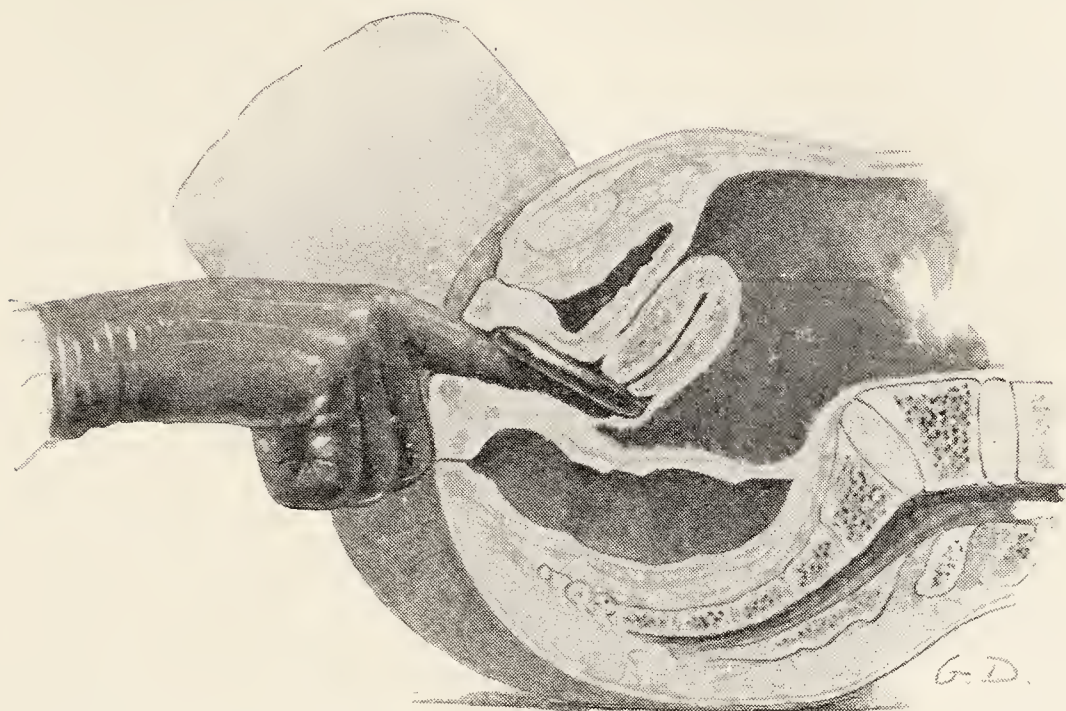


FIG. 20.—Carrying the distal part of the pessary back behind the cervix after the pessary has been inserted into the vagina.



FIG. 21.—The pessary in the correct position, the woman standing up.

may, however, be occasions on which it is necessary for a patient to have her pessary changed and she is unable to secure the services of a medical man. Even then the services of the nurse must be limited to the extraction and insertion of a ring pessary since for the proper insertion of a Hodge pessary the uterus has first to be replaced in its normal position, a procedure which no nurse can be expected to accomplish and which, indeed, she should not essay.

The method of inserting a ring pessary can be taught practically much better in a few minutes than by any description, and nurses attending the gynæcological out-patient department, and who intend to practice as district nurses, would do well to ask the doctor to teach them the proper method. The patient should be lying in the left lateral position with the right leg well drawn up. The ring, having been inserted in boiling water for a few minutes to soften the rubber and sterilize the surface, is pinched by the thumb and index finger of the right hand till it is compressed into an ellipse. With the left hand separating the labia the pessary is introduced through the vulval orifice, one edge directed towards the apex of the pelvic arch and the other edge towards the perineum. When most of the pessary has disappeared into the vagina the ring is allowed to expand with the result that the whole of the pessary disappears. The forefinger is then passed into the vagina and the pessary is turned round so that its edges now rest against the sides of the vagina. Lastly, again with the forefinger, the upper part of the ring pessary is hooked behind the cervix, so that it is resting in the posterior vaginal fornix, the cervix now being surrounded by the ring. Many women learn to do this themselves.

CHAPTER XI.

DISTURBANCES OF MICTURITION.

THE following disturbances of micturition will be discussed: retention, incontinence, frequency, suppression, and pain. Although such disorders are found associated with other diseases, they may have a distinct bearing on diseases of a gynæcological nature.

RETENTION OF URINE.

If a woman is unable to micturate, although the urine excreted by her kidneys is passing into her bladder, the latter organ becomes unduly distended, and the condition is termed retention of urine.

CAUSES.—

Retention of urine is due either to some interference with the nervous mechanism of micturition or to pressure on the neck of the bladder and urethra.

Interference with the Nervous Mechanism.—*Hysteria*.—This may be the cause in young women who crave for sympathy, and whose nervous system is in an unstable condition.

Pain in the Urethra or Bladder.—If the act of micturition gives rise to severe pain the woman will prevent its repetition as long as possible, and in this way retention sometimes results. The following are causes of pain in the urethra: inflammation of the urethra, generally due to gonorrhœa; urethral caruncle; cancer implicating the urethra. Pelvic peritonitis causes pain by the contracting bladder moving the inflamed peritoneum.

Retention also occurs in some patients, for a day or so after

labour. This may be due to the patient being on her back, an unusual position for micturition, or to the necessary straining to empty the bladder causing pain in a tender abdominal wall. It may also be due to the pain caused by the urine flowing over the vulva which has been torn, more particularly in the region of the urethra.

Shock.—Retention of urine is very common after operations, especially those on the abdomen, vagina, perineum, and rectum. The retention is due to the centre in the spinal cord, which controls the act of micturition, being temporarily affected by nerve impulses during the operation, or by injury to the nerve supply of the bladder.

Disease of the Central Nervous System.—In certain diseases of the nervous system the bladder is cut off from the higher centres which govern the act of voluntary micturition, the bladder then acting automatically. In locomotor ataxy there may be sudden and involuntary contractions of the bladder (vesical crises).

Over-distension of the Bladder or Abdominal Walls.—If a woman holds her water too long the bladder will become over-stretched, then, when she desires to micturate, the bladder muscle will not contract, and retention results. It is not an uncommon occurrence during the first day or so after labour for the patient to have retention of urine, because the abdominal muscles have been so stretched by the pregnant uterus that they cannot press on the bladder and so, as is their custom, assist this organ to contract.

Pressure on the Neck of the Bladder or Urethra.—The urethra being the muscular canal through which the urine leaves the bladder, it is evident that if anything presses on this tube sufficiently, retention must result. The neck of the bladder may be compressed and vagina stretched by the cervix of a retroverted pregnant uterus. An ovarian cyst or fluid in the pelvic cavity behind the uterus (blood, serum, or pus) may push the uterus against the neck of the bladder. If a fibroid tumour is nearly impacted in the pelvis, the addition to the tumour of an additional amount of blood may lead to impaction

(tightly filling the cavity of the pelvis) and retention of urine. An additional amount of blood flows to the uterus in the week preceding menstruation. The complication, therefore, of retention of urine just before the period, which may be relieved by the onset of the period, should indicate to the nurse that a fibroid tumour may be present, which diagnosis is all the more certain if the menstruation is excessive. Ignorance of these facts has often lead to the condition remaining undiagnosed for some months, especially in those cases in which the loss is not excessive (cervical fibroids). The lumen of the urethra may also be occluded by cancer, by a stone or by a fibroid polypus.

In the second stage of labour, the head may fill the vagina so tightly that the urethra is pressed upon, and if the bladder has not been emptied repeatedly during the first stage of labour, as it should be, retention may result.

If the vagina is properly plugged the urethra must be pressed upon and retention results, as also it will be if a Champetier de Ribes's bag is being used. The knowledge of this will remind the nurse that before plugging the vagina, the bladder must be emptied, preferably by catheter, otherwise the plug may have to be taken out, before it should be, to allow the patient to empty the bladder.

SYMPTOMS AND SIGNS.—

The patient will complain of severe and continuous pain in the lower abdomen, with intermittent exacerbations, and will state that she cannot pass her water. An abdominal examination will disclose a central, soft and somewhat fluctuating swelling above the pubes, pressure upon which causes a certain amount of distress.

TREATMENT.—

It is most important that, the urine having been drawn off, the cause for the retention should be found, since unless efficiently treated retention will give rise to cystitis.

For hysterical retention relief by catheter may be necessary on the first occasion, but every means should be taken

to prevent a further continuance of its use. If a strong purge be given, micturition usually takes place when the bowels act. Another method is to seat the girl in a bath with hot water reaching to the hips, and then, without any warning, to empty a pailful of cold water over her head and body. Retention after labour and operations is treated by an alteration in the position of the patient, sponging the vulva with warm antiseptic lotion, rubbing her back, placing the patient on a bed-pan containing a little hot water and by supra-pubic pressure. Some cases are successfully treated with an injection of pituitary extract or by giving to drink a drachm of the liquid extract of ergot in a pint of soda water. If such harmless measures fail the catheter will have to be used.

For the remaining causes of retention appropriate treatment will be prescribed by the medical practitioner.

NURSING.—

If the nurse has to pass a catheter she must be most careful to carry out all the precautions mentioned on page 271.

INCONTINENCE OF URINE.

Incontinence of urine is a term denoting the dribbling away of urine from the bladder irrespective of any wish of the patient. The urine may also dribble away in cases in which the ureter has been injured during a hysterectomy, either by being tied or cut, or by its blood supply being interfered with. In the latter case the ureter sloughs and the incontinence appears some ten days later, the cut or sloughing end being, as a rule, engrafted on to the top of the vagina. The ureter may also be injured in labour during the extraction of a child by the forceps. The following varieties of incontinence may be met with: false incontinence; true incontinence; incontinence of retention; and nocturnal incontinence.

False Incontinence.—

False incontinence is a condition in which the urine escapes from the bladder on the slightest exertion. The patient states that if she coughs, sneezes, laughs or strains as when lifting heavy weights, or when dancing, playing golf or tennis she is apt to “wet herself.” Such a condition most commonly follows childbirth and is due to stretching of the sphincter of the bladder.

TREATMENT.—

The best treatment, and it is usually most successful, is for the sphincter to be tightened by an operation. An alternative treatment though not nearly so successful is the use of electricity.

True Incontinence.—**CAUSES.—**

In this condition the urine cannot collect in the bladder because there is a hole leading from it into the vagina, a complication known as a vesico-vaginal fistula, or because the sphincter of the urethra has been badly damaged.

The fistula may be due to an ulceration of the vagina and bladder from prolonged pressure of the head of the child during labour, when its passage is obstructed by a generally contracted pelvis, or from cancer, tubercle, syphilis or a neglected pessary. It may also be due to injury during the delivery of the head of the child with the forceps, or to some operation in the neighbourhood of the bladder.

Injury to the sphincter of the urethra is due to childbirth or to mechanical dilatation for purposes of a digital examination of the bladder.

SYMPTOMS AND SIGNS.—

The constant escape of urine causes much irritation and soreness of the vulva and adjacent parts, while unless the dressings are frequently changed, the stale urine becomes very offensive.

TREATMENT.—

If the fistula is due to injury it can be cured by a plastic operation. If due to disease and this can be cured, the fistula will heal.

Incontinence of Retention.—**CAUSE.—**

In some cases the pressure of the urine that is retained in the bladder becomes so great that the sphincter at the neck of the bladder is forced open and a small quantity of urine escapes, and after the immediate pressure is relieved the sphincter closes again. The retention is, therefore, intermittent and the condition is known as “incontinence of retention.”

SYMPTOMS AND SIGNS.—

The patient will complain of the symptoms enumerated under retention of urine and will be constantly passing a small quantity. The bladder will be found distended and, unless there is cystitis, the urine will be normal, in this respect differing from that associated with the frequent passage of small quantities due to cystitis.

TREATMENT.—

The bladder having been emptied with the catheter, the fact must at once be reported to a doctor.

This condition is really more dangerous than complete retention, since the nurse, if she is careless and does not notice that only a small quantity of urine is being passed at a time, is apt to regard the condition as one of frequency only and fails to report the matter as soon as she should do, and it may then happen that, before the retention of urine is discovered, cystitis will have been set up, ending perhaps fatally.

Nocturnal Incontinence.—

In this condition, which generally occurs in young children, the urine is passed unconsciously while the child is asleep.

CAUSE.—

In some patients a cause cannot be discovered ; in others it is due to the presence of worms, stone in the bladder, polypus of the rectum, infection with the colon bacillus, inflammation of the vulva, very acid urine or epilepsy.

TREATMENT.—

The treatment of nocturnal incontinence must depend upon the cause.

In the absence of any cause being discovered, the patient should sleep on a hard bed with very light clothing. If young she should be roused when her parents go to bed and made to empty her bladder. Very little drink should be allowed with the last meal of the day. A large reel of cotton may be tied round the waist so that it rests on the spine ; this will prevent the patient lying on her back, a position which seems to favour the involuntary expulsion of urine in these cases. Cold baths and a cold douche to the spine are often helpful.

For the medicinal treatment a doctor must be consulted ; belladonna is the most successful drug to be employed.

FREQUENCY OF MICTURITION.

CAUSES.—

Excessive Quantity of Urine.—Hysteria, diabetes, chronic Bright's disease, a very acid urine or one loaded with oxalates and phosphates.

Pressure on the Bladder.—Pregnant uterus, ovarian tumour, fibroid tumour.

Misplacement of the Bladder.—Cystocele, with or without prolapse of the uterus. An indication that a cystocele may be the cause is the fact that the urine escapes from the bladder on the slightest exertion, such as laughing or sneezing. When the patient is at rest there is no frequency.

Disease of the Bladder.—Acute and chronic cystitis, infection with bacillus coli.

Pressure on the Urethra or Neck of the Bladder.—Leading to incontinence of retention.

TREATMENT.—

The passage of an excessive quantity of urine is in most cases a serious symptom, and a doctor should be consulted at once. The nurse must be careful to remember that frequency of micturition is also a sign of retention.

PAINFUL MICTURITION.

CAUSES.—

Cystitis, due to infection or associated with ulceration of the bladder, due to cancer or tubercle, or to a stone or some other foreign body. It may also be due to pelvic inflammation, and to inflammation of, or a growth in, the urethra and to the action of certain drugs, hexamine being a case in point.

TREATMENT.—

The treatment of these conditions is carried out by the doctor.

SUPPRESSION OF URINE.

Suppression of urine, which may be partial or complete, is a condition in which the kidney is not acting properly. In complete suppression no urine will be passed by the patient and the bladder is found to be empty. In partial suppression much less than the normal quantity of urine is passed, the bladder being emptied by each act of micturition.

CAUSES.—

Suppression of urine may be due to disease of the kidneys, or to occlusion of the ureters by a tumour, or by a ligature accidentally applied during some operation in its neighbourhood. Suppression may follow the ligature of one ureter.

Partial suppression for the first twenty-four hours after a severe operation involving a good deal of shock is not an uncommon occurrence. It must be remembered, how-

ever, that the quantity of fluid drunk by the patient for some hours prior to and following an operation is much less than normal. Partial or total suppression of urine is associated with that complication of pregnancy known as eclampsia.

SYMPTOMS AND SIGNS.—

The patient does not suffer for the first few days. Vomiting then supervenes and becomes constant. She then becomes drowsy, may have convulsions, and passes into a coma.

SIGNS.—

The quantity of urine that is passed is much diminished, or the bladder is found empty on catheterization.

TREATMENT.—

If the suppression is not due to occluded ureters the doctor will order one or other of the following methods of treatment: hot-air baths, purges, dry-cupping to the loins, an intra-venous saline transfusion, continuous rectal saline and pilocarpin.

CHAPTER XII.

INFECTION.

BEFORE describing those diseases of the genital organs due to infection, it will be well to give a short account of infection and what it means.

The term infection as here used means the communication of disease through the agency of microbes.

MICROBES.

A microbe is a minute living body, in some cases not larger than $\frac{1}{25000}$ of an inch across, which can only be seen with the aid of a microscope. It belongs to the lowest form of life, and consists of a single cell.

A microbe is either a bacterium or a protozoon. A bacterium is a single vegetable cell with a homogeneous structure. A protozoon is a single animal cell, higher in the scale of life than a bacterium because a part of the cell, essential for life and reproduction, is recognizable as a special structure known as the nucleus. Pathogenic microbes are those which affect adversely the health of animals or plants, and according to our present knowledge, there are only a comparatively few varieties that act in this way on the human body. The majority of microbes are harmless to human beings, and indeed, in the absence of some varieties of microbes, animal and vegetable life would be impossible. Microbes were first discovered some 250 years ago. Their importance, however, was not appreciated till about 1850, when Pasteur proved that certain diseases were due to special kinds of bacteria. Following on this discovery, and because of it, Lister invented his method of antiseptic surgery, by which, together with its more recent improvement

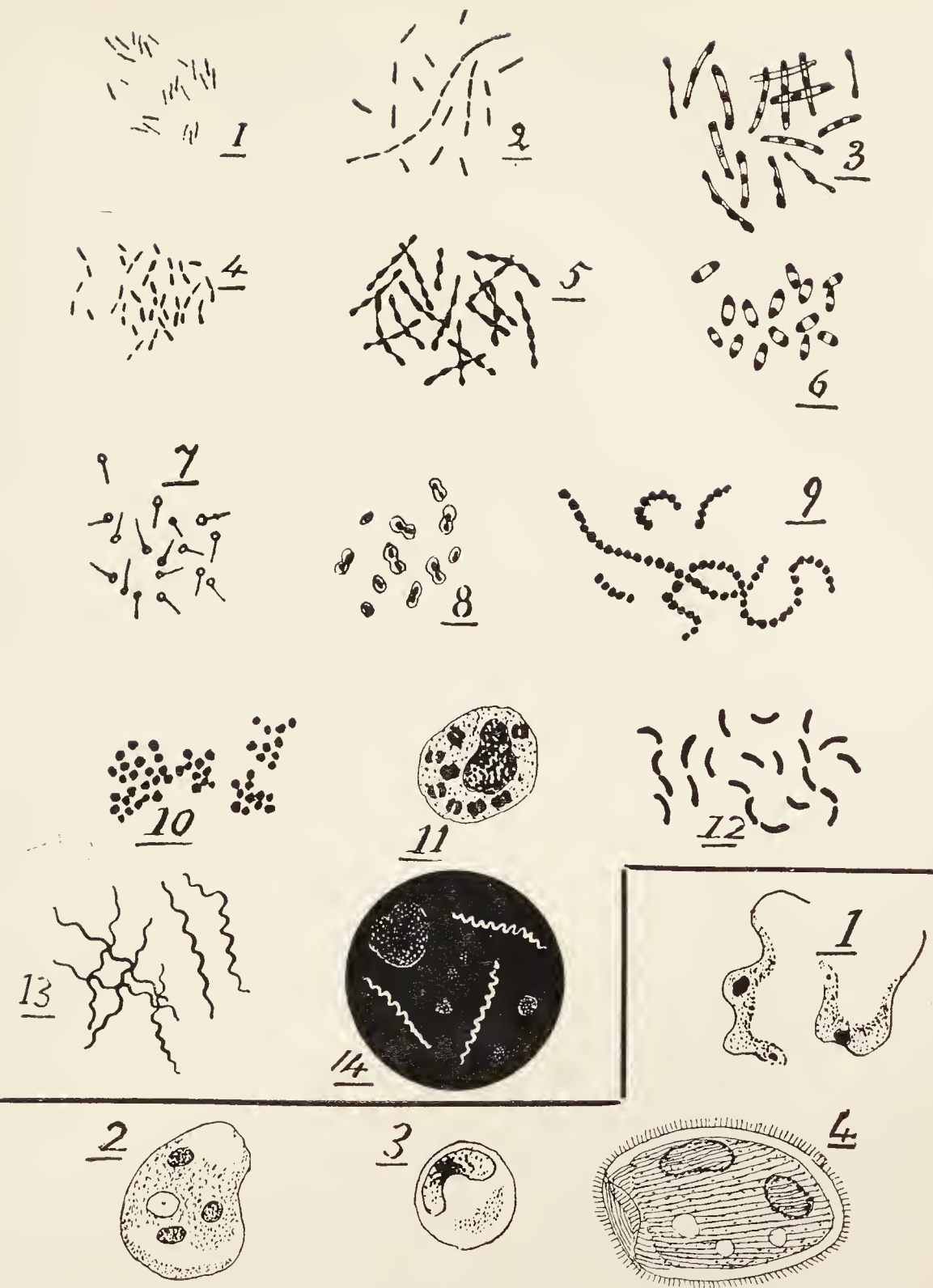


FIG. 22.—*Bacteria*.

1. Tubercle; 2. Typhoid and colon—same in appearance; 3. Diphtheria;
4. Influenza; 5. Leprosy; 6. Plague; 7. Tetanus; 8. Pneumococcus;
9. Streptococcus; 10. Staphylococcus; 11. Gonococcus and meningococcus—same in appearance; 12. Cholera; 13. Relapsing fever; 14. *Treponema pallidum*. The bacteria are shown inside a white blood corpuscle, their usual situation.

FIG. 23.—*Protozoa*.

1. Trypanosome; 2. Amœbæ of dysentery; 3. Malaria—parasite inside a red blood corpuscle; 4. *Balantidium coli*.
- The bacteria and protozoa here depicted are not drawn to scale, but merely in a diagrammatic form to show their appearance.

of aseptic surgery, such an infinite amount of suffering, and so many millions of lives, have been and will be saved.

BACTERIA.

A bacterium can only be seen with the highest powers of the microscope. When magnified a thousand times a spherical bacterium appears about the size of a pin's head. If, however, bacteria are planted on to certain substances, such as blood-serum, broth, or potato, they flourish and multiply much as seeds do when planted in the earth. The artificial cultivation of bacteria on suitable media, and the study of the appearance and growth-characters of microbes, forms the science of bacteriology. Bacteria multiply at a prodigious rate, it being estimated that, under favourable conditions, a single microbe can become a grandfather three times in one hour. Thus a single microbe planted on to a suitable medium multiplies so rapidly that within twelve hours there appears a large colony visible to the naked eye.

Varieties of Bacteria.—The three main varieties of bacteria are :—

1. Bacilli or straight bacteria, slightly curved rod-shaped microbes. The tubercle, colon, diphtheria, influenza, leprosy, plague, tetanus, and typhoid bacilli being examples.
2. Cocci or spherical bacteria. Streptococci and staphylococci, the cause of peritonitis, septicæmia, pyæmia and other varieties of septic infections ; streptococcus, the cause of erysipelas and staphylococcus of abscesses and boils. Pneumococcus, the cause of pneumonia ; gonococcus, the cause of gonorrhœa ; and meningococcus, the cause of cerebro-spinal meningitis, being examples. As a rule the streptococcus is a much more deadly microbe than the staphylococcus.
3. Spirilla or vibrios : markedly curved bacteria. The most characteristic shape is that of a comma. The spirillum of cholera is an example.

4. *Treponemata*: Thin spiral-like microbes that have the power of motion by contracting and expanding their spirals, by lashing movements and rotatory movements.

Examples are the *treponema pallidum* of syphilis and the *treponema obermeyerii* of relapsing fever.

Action of Bacteria.—Those bacteria which are commonly found in air and water, and which will not grow at the body temperature, are mainly harmless.

Bacteria in nature are found living on dead animal and vegetable matter and in such circumstances are known as *saprophytes*. In such sites bacteria are harmless, and, indeed, they are performing a function essential for the continuance of animal life on the earth. A true saprophyte is a bacterium which causes the putrefaction and decomposition of dead animal and vegetable matter; it breaks up the dead tissue into simple compounds of carbon and nitrogen and these find their way into the earth and in due course are utilized by plants in the process of growing. The cycle is completed by animals eating the plants. Thus from the dead animal tissue, through the agency of bacteria, there eventually emerges food to nourish a living animal.

Saprophytic bacteria are found in enormous numbers in the lower part of the intestine of human beings and animals, and here they decompose into simple substances any of the food remnants that have escaped the action of the digestive juices. Saprophytic bacteria in their natural sites do no harm, but many of them become pathogenic when implanted into an unnatural site, such as the tissues or blood-stream of a human being. For example, the tetanus bacillus is a saprophyte found naturally in large numbers in the fæces of horses; if a wound becomes infected with soil which has been manured the tetanus bacillus becomes a highly pathogenic bacterium and causes an often fatal disease.

Those bacteria which can exist and multiply only in living tissues are known as *parasitic bacteria*, and include among their members nearly all those microbes that are the cause of disease. Some pathogenic bacteria are both saprophytic

and parasitic. Thus in certain circumstances they harm the individual, by means of their poisons which are absorbed, without themselves gaining entrance to the tissues of the body or into the blood-stream. In other circumstances they invade the tissues or blood-stream and by means of their poisons injure the individual in this way. Examples of bacteria which can be both saprophytic and parasitic are those causing sepsis, the coccus which living on urine changes the urea into ammonia thus causing cystitis, and the bacillus coli which may be the cause of peritonitis or cystitis.

Other bacteria are entirely parasitic, as, for instance, the diphtheritic, tubercle and typhoid bacilli.

Bacteria cause disease in the human body by means of their secretions. These poisons, or toxins as they are called, which are absorbed by the tissues of the body, are of two kinds, *exotoxins* and *endotoxins*.

Certain bacteria, such as the diphtheria and tetanus bacilli, when living in the tissues, liberate poisons which circulate in the blood-stream and cause the characteristic symptoms of diphtheria or tetanus. In that these poisons exist free and apart from the bacteria themselves they are called exotoxins.

Many parasitic bacteria, however, liberate their poisons into the blood-stream in an entirely different way. On gaining entrance into the blood-stream more or less of their number are attacked by certain cells of the blood called phagocytes which eat them. On the death of the microbe it gives out a poison which in its turn kills the phagocyte and the latter then breaks up and liberates this poison into the blood. Such poisons are called endotoxins. It will be seen therefore why, unless the dose of poison is a fatal one, a saprophytic infection is so much less dangerous than one due to parasitic bacteria. In the first case if the surgeon removes all the dead tissue any saprophytes that may be left perish. But with a parasitic infection it is impossible for the surgeon directly to remove all bacteria swarming in the blood, it would mean bleeding

the patient to death. All he can do is to endeavour to increase the activities of the body-cells and body-fluids (which see hereafter) in the hope that they will destroy all the bacteria and their poisons.

Pathogenic bacteria may remain local, or may become distributed through the tissues by the medium of the blood-stream.

Bacteria may invade the body by contagion, ingestion, inhalation or inoculation, examples of which are the following :—

1. Contagion, as in small-pox, scarlet fever, and gonorrhœa.
2. Ingestion, as in cholera and typhoid fever, through the medium of liquid or solid food.
3. Inhalation, as in diphtheria, tuberculosis, and whooping-cough.
4. Inoculation through a wound, as in general and local sepsis, and tetanus, or by the bite of a rat-flea, as in plague.

When a pathogenic microbe gains entrance to a human body certain factors come into play which determine whether disease shall result or not.

The main factors involved are the dose of the microbe, the virulence of the microbe and the resistance of the person. Thus a person may be able to overcome and destroy a small number of microbes but would succumb to a large dose.

Virulence means the power of a microbe to produce disease. This power may become raised by several methods, one of the commonest being the quick passing of the organism from one being to another. This accounts for the extreme danger of operating theatre or post-mortem wounds, or cases of puerperal sepsis.

A healthy person has more resistance to disease than one who is run down, and it is the aim of all medical treatment to build up the general health of a patient. A healthy person may overcome a dose of a virulent microbe, whereas

a weakly person may succumb to a small dose of a fairly non-virulent germ.

Universal Distribution of Bacteria.—Wherever air and dust find entrance there can bacteria be discovered, and they are, therefore, always to be found on the skin and in the mouth and the respiratory passages. After the first few weeks of life the alimentary canal always contains millions of bacteria. Though originally derived from foodstuffs and saliva it cannot be said that drink and food materially add to the numbers in later life. The numbers are kept up because the organisms naturally multiply in the intestine. About one-tenth the weight of normal dried fæces is due to bacteria. The uterus and Fallopian tubes are normally free of bacteria, but microbes are always present on the vulva and in the lower part of the vagina.

The Reproduction of Bacteria.—A bacterium reproduces itself by dividing into two, then into four, then into eight and so on, with the result that in a very short time, if there is sufficient food, moisture and warmth available, the one bacterium will have increased to millions; in fact only an unfavourable environment will check their indefinite increase though in the process of multiplication many of the microbes die off.

Certain varieties of bacteria, which are nearly all included in the bacillus group, when their surroundings are not conducive to their reproduction, pass into what is called a "resting stage." In this condition the contents of the cell become transformed into an oval body known as a *spore* which has the power of retaining its vitality, even under adverse conditions, for long periods of time. In favourable circumstances the spores return to their original shape and the bacteria renew their activities. These spores are very difficult to kill, and some of them will escape destruction even when heated to a temperature higher than that of boiling water and though this high temperature be maintained for as long as fifteen minutes. Catgut, which is made from the intestines of sheep, contains large numbers of spores often of the bacillus of tetanus. Hence it is ex-

tremely difficult to sterilize catgut, and most careful tests have to be made before any batch is passed as fit for surgical use.

Bacteria, like other living organisms, require for their well-being, food, moisture and warmth, but most of them grow better in the dark. Whether in addition they require free oxygen depends upon what kind of bacteria they are. Thus there are aerobic bacteria which must have free oxygen, and anaerobic bacteria which will not grow in the presence of free oxygen but which obtain such oxygen as they require by breaking up the organic combinations of the medium in which they are growing.

Some bacteria are able to grow either with or without free oxygen and on account of their adaptability in this respect are called *facultative*.

Food.—Bacteria in nature find the food they require in the dead, or living, vegetable or animal matter surrounding them. In the human body the bruised and sloughing edges of any wound form a favourable site for the propagation of saprophytic bacteria, while the parasitic bacteria obtain nourishment from the blood-serum, and may pass through a wound into the blood-stream.

Moisture.—Bacteria require moisture for their growth; they are harmless if they are dry. When getting ready a room in a private house for operation, therefore, unless there is time to prepare it thoroughly, clean sheets should be placed over any articles of furniture with which the nurse or doctor may come in contact.

Warmth.—Some bacteria for their growth require more heat than others. Pathogenic bacteria grow best at the body temperature.

Light.—Prolonged exposure to sunlight kills most bacteria. The wisdom, therefore, of living in a room well flooded with light is obvious.

PROTOZOA.

A protozoon can only be seen with the aid of a microscope. Protozoa, of which there are many varieties, vary

in size and shape much more than do the bacteria, while to many of them are attached different shaped appendages, which enable them to move about or perforate animal tissues in their immediate neighbourhood.

Action of Protozoa.—Those varieties of protozoa which are known to cause disease in man are few in number and are parasitic in nature, but there are a large number of species which are the cause of disease in animals and plants. The majority of protozoa are saprophytic. It is not known how protozoa cause disease.

Varieties of Protozoa Pathogenic to Man.—

Protozoa are divided into four classes :—

1. Flagellata—with a whip-like appendage.

Trypanosomes, the cause of sleeping sickness, being an example.

2. Sarcodina—without any capsule.

Amœbæ, the cause of dysentery, being an example.

3. Sporozoa—sporulating forms.

Plasmodia, the cause of malaria, being an example.

4. Ciliata—with cilia attached.

Balantidium coli, a cause of diarrhœa, being an example.

Protozoa invade the body by inoculation or ingestion.

1. Inoculation—either through the intact skin or mucous membrane, as in syphilis, or by the bite of a mosquito, as in malaria.

2. Ingestion—through liquid or solid food, as in amœbic dysentery.

Distribution of Protozoa.—Protozoa are distributed very widely, being found in sea-water, stagnant fresh water, and in moist soils. None of the protozoa pathogenic to man form spores. Some of them, for instance amœbæ, enter a resting phase known as *cysts*, which can exist in a damp medium such as soil, but they perish quickly if dried. No protozoal infection is carried by air.

Reproduction of Protozoa.—In some species of protozoa the method of reproduction is as simple as that which ob-

tains in bacteria, but in others it is very complicated. Thus a protozoon may be living in one animal but in order to infect another the parasite has to be conveyed and inoculated into that animal by the bite of an insect. The insect draws some of the blood of the first animal and in so doing withdraws some of the parasites; the parasites undergo further development in the body of the insect and when the latter bites another animal this becomes infected. The parasitic protozoa of amœbic dysentery and malaria live on red corpuscles.

ULTRA-MICROSCOPIC ORGANISMS.

The microbes causing certain infectious diseases are so small that they cannot be seen, even with the highest powers of the microscope.

These diseases include—

Small-pox, Encephalitis lethargica, Measles, Mumps, Hydrophobia, Infantile paralysis, Yellow fever, and Typhus.

That such diseases are due to ultra-microscopic microbes seems to admit of very little doubt for the following reasons :—

1. Some of these diseases can be transmitted to a healthy animal by injecting into it blood or secretion from an animal known to be suffering from the disease. If this blood or secretion, however, is first heated to a certain temperature it has no effect when injected. Obviously, therefore, some living substance has been destroyed by the heat.
2. The disease can be transmitted, although the blood or secretion has been passed through a porcelain filter with such small holes that these would prevent the passage of the smallest microbe visible by the microscope. Therefore the disease cannot be due to any microbe which can be seen by the microscope.
3. All the diseases are highly contagious or infectious.

CHAPTER XIII.

IMMUNITY.

THE power of an individual to protect itself against the results of bacterial invasion is due to the presence in its blood of two factors :—

1. Certain substances called antibodies, secreted by cells of the body. Such antibodies and complement are probably always present in the blood-serum in minute quantities, but become markedly increased when the person is attacked by bacteria.
2. Certain cells derived from the tissues of the body called phagocytes.

If an individual runs the risk of catching a certain contagious or infectious disease and does not do so, he or she is said to be immune to that disease. Such immunity, which may be permanent or temporary, is either natural or acquired. Natural, if the individual has such a supply of healthy phagocytes and such a quantity of antibodies that it is able to kill the bacteria, or neutralize their poisons; and acquired, if by a previous attack of the disease, or by artificial means to be indicated later, it acquires a similar power. It must be remembered, however, that the phagocytes cannot act efficiently unless aided by the antibodies. Although it is known that some of these antibodies combat disease, what the action of the remainder may be in this respect, if any, is not known. Further, bacteria, under certain conditions, by a protective mechanism of their own, prevent the body-fluids and body-cells acting on them.

To understand more clearly the theory of immunity it is necessary to consider a little more in detail the antibodies and phagocytes.

Antibodies.—

The antibodies which can be found in the blood-serum of an immunized animal may be divided into two groups:—

1. Antibodies whose action in disease is known: Antitoxins, Opsonins, Bacteriolysins, Complement.
2. Antibodies whose action in disease, if any, is not known: Agglutinins, Precipitins.

It must be remembered, however, that there are different sorts of antitoxins, opsonins, and bacteriolysins, and that the antitoxins resulting from the infection of one variety of bacteria, for instance, will not be of any use for immunization purposes against another variety of bacteria.

Antitoxins are antibodies found in the blood-serum of an animal as the result of the injection into that animal of bacterial toxins. The serum of the blood drawn off from the animal is called antitoxic serum. The remaining antibodies are due to the injection of bacteria, the serum drawn off being called antibacterial serum.

Antibodies whose Action in Disease is Known.—

Antitoxins.—If certain bacteria invade the body of an animal which is not immune they increase at a prodigious rate and secrete poisons which are absorbed into the system of the animal. These poisons are called toxins, endotoxins and exotoxins, and if their amount is sufficiently large the animal dies. The endotoxins are derived from the bacterial proteid escaping on the death of the parasite.

Such toxins can be obtained in a test-tube by growing the bacteria in broth for some days and then filtering the broth. That the filtrate contains the toxins can be proved by injecting a certain quantity of it into an animal when it will die. The smallest quantity which will cause death is called the minimum lethal dose. It has been found, however, that if a much smaller quantity than the minimum lethal dose is injected, and then with repeated injections this quantity is gradually increased, it is possible in time to inject doses of toxin far greater than the minimum lethal

dose, without harming the animal, and the animal is then said to be immunized. If some blood-serum from an animal thus treated is now taken and mixed with a lethal dose of the toxin, the mixture can be injected into another animal, with impunity. Obviously, therefore, the blood of the immunized animal must contain an antidote to the toxin and this is called an antitoxin. In other words, the injection of repeated and increasing doses of bacterial toxin stimulated the body-cells of the animal, when it was being thus immunized, to produce antitoxins, and to produce such a quantity that there was more than sufficient to neutralize the amount of bacterial toxin injected, and finally a surplus remained in its blood-serum.

Unfortunately, it is not every variety of bacterial toxin that stimulates the body-cells to produce antitoxins. Only a few do this, the commonest being the bacilli of diphtheria and tetanus, in which diseases the bacilli do not as a rule invade the blood-stream, but are fixed in the throat or wound respectively, their toxins only being absorbed.

If a person is attacked by one of these diseases and recovers, his body-cells have produced sufficient antitoxin to neutralize the bacterial toxins, if he dies the quantity is too small. In the light of the experiment recorded, it should be possible by injecting a sufficient quantity of antitoxin, either to protect a person against the disease, if he be subjected to the risk of acquiring it, or to cure the patient if he has the disease, and up to a point this can be done.

Opsonins.—An opsonin is an antibody which makes the bacteria palatable to the phagocyte, and this fact can be demonstrated by experiment.

Bacteriolysins, Complement.—Bacteriolysins are antibodies which shrink or break up bacteria. They cannot do this, however, without the assistance of the complement, but the two together will, in some cases, cause bacteria to dissolve.

In addition, the knowledge of the presence of a particular bacteriolysin is very important from the point of view of diagnosis. Thus if the disease from which a patient is

suffering cannot be diagnosed, but it is found that his blood-serum will shrink or break up a particular variety of bacterium, it may be taken for granted that he is infected with this microbe.

Antibodies whose Action, if any, in Disease is Not Known.—

Agglutinins.—Agglutinins are substances which make certain bacteria stick together, “clumping” as it is technically called. That this antibody is present in the serum of an immunized animal, can be proved by adding its blood-serum to fluids containing bacteria similar to those with which the animal was immunized, and then placing a drop of the mixture under a microscope, when the bacteria will be seen to clump. It is not known what part the agglutinins play in immunity. As far as can be ascertained they do not tend to protect the animal, since such an animal may be immune although the bacteria do not clump, and relapses in typhoid fever may occur in a patient when the agglutinating power of his blood-serum is at its highest.

This antibody is, however, of use in diagnosing typhoid fever, and cerebro-spinal meningitis. It may be taken as a working rule, the exceptions to which we need not concern ourselves, that if the blood-serum of a patient, diluted to a certain strength, clumps the micro-organism, causing typhoid fever or cerebro-spinal meningitis, the patient has that disease. This experiment, as far as typhoid fever is concerned, is known as the “Widal reaction.” Theoretically it should be possible to diagnose other diseases by similar methods, but at present the technical difficulties have proved insurmountable.

Precipitins.—Precipitins are substances found in the blood-serum of an animal, immunized against bacteria, which produce a precipitate in a clear solution of the filtrate from a test-tube culture of the same variety of bacteria. They are also found in the blood-serum of an animal immunized by the injection of animal or vegetable

albumins, and cause a precipitate to be formed in solutions of the same variety of albumins contained in a test-tube.

It is not known what part precipitins take in protecting the animal, but they are of very great importance from a medico-legal point of view. Thus, after a rabbit has been treated by repeated injections of human blood, its blood-serum will precipitate the albumin in a solution of human blood in a test-tube, but it will not precipitate the albumin in a solution of the blood of any other animal. If, therefore, blood-stains are found on the clothes of a person suspected of murder, he may maintain that the blood came from some other animal, if, for instance, he is a butcher, from an ox or sheep. Supposing now a solution is made of the blood on his clothes and some blood-serum from an animal, immunized against human serum, is added and does not cause a precipitate to form, he is telling the truth and *vice versa*. By similar methods it is possible to determine whether a particular sausage is made of pig, horse, cat or dog.

Phagocytes.—

The name phagocyte was given by Metchnikoff to certain white corpuscles found in the blood, and the process by which these phagocytes absorb bacteria he called phagocytosis. The phagocytes can be seen, under the microscope, enveloping and digesting the bacteria. Normally there are in a drop of blood, about the size of a pin's head, 7000 to 8000 *phagocytes*. In bacterial diseases this number may increase up to 40,000, which is an indication of how the tissue-cells of the body assist in combating the disease. This bactericidal power is only properly developed in co-operation with the antibodies.

In connection with the question of immunity, however, it is important to remember that, in many cases, if the bacteria invading the body are not destroyed at once, certain of them may escape destruction later, either by secreting substances called **aggressins** which will paralyse the phagocytes, or by forming a capsule round themselves which

prevent the phagocytes destroying them. In other words the bacteria themselves have become immunized.

An interesting example of this in connection with the bacteria is syphilis. In this disease a person who has passed through the primary stage is practically immune to a fresh attack of syphilis, and yet the treponemata which escaped destruction are now very resistant microbes, and continue, in spite of the natural protective measures of the patient, further to affect her in the secondary and tertiary stages.

The knowledge gained of the immunity reactions may be put to practical use in the case of bacterial invasion in two ways, curative and diagnostic.

The Curative Aspect of Immunity Reactions.—

Natural Immunity.—The natural immunity of a person, which is due to race, family, or age, is increased by nourishing food, temperate habits, cleanliness, fresh air, a proper amount of exercise and rest, and a healthy environment. On the other hand, deficient nutrition, alcoholism, dirt, excessive work, unhealthy surroundings, or some chronic disease will diminish it. To take an example, the bacillus which causes pneumonia is constantly present in the mouths of healthy people without causing any harm. Supposing, however, that some person who harbours the pneumococcus is exposed to cold and rain for a long time, during which he has to work very hard with insufficient nourishment, then he is very liable to an attack of pneumonia. Again, a nurse, fresh from her annual holiday, may prick her finger without any untoward result. At the end of a year's hospital work, however, when her health is sure to be somewhat deteriorated, that is when her resisting power is lowered, such an accident has many times resulted in death, or in a very serious illness.

Artificial Immunity.—The power of the body-cells and body-fluids to protect their owner against a disease, or to modify that disease if it is present, may be increased artificially in a passive way or in an active way.

Passive Immunity.—Passive immunity signifies the results obtained by supplying a patient with antibodies from the blood-serum of another animal. If the body-cells of the patient do not secrete antibodies quickly enough or in sufficient quantities, then he succumbs. The treatment by passive immunity aims at supplying these antibodies quickly and in sufficient doses to cure the patient by having them prepared and ready for use.

Such a passive immunity may be induced:—

1. By the injection of antitoxic serum.
2. By the injection of antibacterial serum.

This treatment of infectious diseases by the method of passive immunity has only been successful in a few cases, but in these such success has been attained, that if the correct antibodies could be isolated for each disease, there is no doubt success should invariably result if the patient is treated early enough. The want of success in all cases is due to the fact that but few bacteria cause disease by the secretion of exotoxins, that is without themselves being destroyed.

In the majority of cases the toxins are only set free on the death of the bacteria, and up to the present no satisfactory methods have been devised by which the antitoxins resulting from the production of these endotoxins can be collected.

Production of Passive Immunity by the Injection of Antitoxic Serum.—This method of producing passive immunity has been very successful in the case of diphtheria and has met with some measure of success in tetanus and gas gangrene.

The injection of diphtheritic antitoxic serum has lowered the mortality of diphtheria in a very striking way, and tracheotomy, which formerly was such a common operation in this disease, is now a rare one.

The injection of tetanus antitoxic serum as a curative agent in tetanus has not been nearly so successful, although the mortality of this disease, as proved in the late war, has also been lowered by this method. The reason for this perhaps is that tetanus cannot be diagnosed from the

local condition as can diphtheria, and so the patient is poisoned seriously before the necessity of injecting anti-tetanic serum is realized. As a prophylactic measure, however, the experience of the late war proved that it was a remedy of great value.

Production of Passive Immunity by the Injection of Antibacterial Serum.—This method of producing passive immunity is not nearly so successful, because there is no means of knowing whether the correct antibodies are being injected. It may be that bacteria which appear to all known tests to be identical, are in reality different. Thus there may be many varieties of streptococci or staphylococci although they all appear to be similar. The antibodies secreted by the body-cells of an animal immunized with one strain of streptococci may, therefore, be different from those immunized with another strain, although both strains appear the same.

Obviously an antibacterial serum will only do good if the person is suffering from a disease due to the same strain of bacteria. An endeavour has been made to overcome this difficulty by immunizing horses with bacteria taken from different patients suffering from the same disease, the resulting serum drawn off from their blood being given the name of polyvalent serum. The assumption that the theory given above may be correct is partly justified, at any rate, since in some cases in which the injection of ordinary antibacterial serum has caused no improvement, an injection of polyvalent serum has apparently led to a cure.

Examples of this method of treatment are the injection of antimeningococcus serum for cases of cerebro-spinal meningitis which is often successful, and also of anti-streptococcic, antiplague, and antianthrax sera, the results of which are more uncertain.

Active Immunity.—Active immunity signifies the results obtained by stimulating the body-cells of the patient to produce their own antibodies.

Such an active immunity may be produced :—

1. By a previous attack of the disease.
2. By inoculation with living bacteria.
3. By inoculation with dead bacteria.

It is not necessary here to discuss the first of these methods.

With regard to the second and third methods, they are of value mostly as prophylactic measures in the treatment of bacterial invasion, since as they take some time to bring about the desired result, the patient may have died, or recovered, from the disease before they can act.

Production of Active Immunity by the Inoculation of Living Bacteria.—There are two diseases only, small-pox and hydrophobia, in which the inoculation with living bacteria is still practised, but, in these, the results clearly show that in suitable cases this method is of great value. The particular microbe causing these two diseases is ultra-microscopic, so that some substance which is known to contain the causative agent, namely, the secretion from a pustule of cow-pox or some emulsion of the spinal cord of a dog immunized against hydrophobia must be used.

Small-Pox.—Cow-pox is supposed to be the modified form of small-pox in the cow. Some of the pustules are situated on its teats. Jenner noticed that if a milkmaid, with scratches on her hand, milked a cow suffering from cow-pox, she did not suffer beyond having a slight local inflammation on her hands, and, what was more striking, she did not catch small-pox, or if she did, she had it in a modified form. In other words, the passage of the small-pox virus through the cow alters the virus in such a way that if a human being is infected with some of this virus, a small pustule at the seat of inoculation results, and as a rule nothing more, while the individual is immune to small-pox, or if he acquires it will only have it in a modified form.

Jenner published his discovery in 1789, a discovery leading to vaccination, which has almost stamped out small-pox in those countries in which this is compulsory.

Hydrophobia.—The microbe causing hydrophobia is unknown; its virulence can be increased by inoculating a rabbit with an emulsion of the spinal cord of a mad dog, and then another rabbit with an emulsion of the spinal cord of the first rabbit, and so on. At one time the cord of the rabbit containing the living virus was inoculated, but nowadays the cord is treated with carbolic acid to kill the virus, and graduated doses are injected into human beings which immunizes them against hydrophobia. Thus the mortality of hydrophobia has been reduced from 16 to $\frac{1}{2}$ per cent. The treatment must be commenced early, and is successful because of the long incubation period (40 days).

Production of Active Immunity by Inoculation with Dead Bacteria.—Bacteria, from a patient suffering from an infective disease, are procured and grown under suitable conditions in an incubator, which is a kind of oven. When sufficient bacteria have grown they are mixed with normal saline and then killed by heat. The emulsion of dead bacteria is then standardized and put up in hermetically sealed glass flasks, each containing the equivalent of a certain number of bacteria, 5, 10, 20, 50, 100 million as the case may be. Persons injected with such solutions may be immunized or partially immunized, the best-known examples being the inoculation with anti-typhoid serum, which has almost stamped out typhoid fever in the Army, and even in those persons who have acquired the disease the mortality has been most strikingly decreased. Similar protective inoculation is used for cholera and plague. This method has also been employed as a curative agent in puerperal fever and other diseases, but not so successfully, and in such cases it is considered best that the solution should be auto-genous, that is, prepared from the bacteria already infecting the patient.

Unfortunately, immunization with dead bacteria is not by any means always successful. Such failures, however, are almost certainly not due to the method employed, but are probably due to two reasons. The one because the exact variety of bacteria cannot always be determined, the other

because the illness is due to a mixed infection, the particular bacteria causing the disease influencing the harmless bacteria, which commonly frequent the body, in some way which is not known, and so causing them to become harmful.

The Diagnostic Aspect of Immunity Reaction.—This has already been touched upon when discussing certain of the antibodies. To give a few examples :—

The presence of typhoid and paratyphoid fevers and other infections may be inferred if the blood-serum of the patient who is ill clumps emulsions of the bacilli causing these diseases—*the agglutinin test*. The presence of syphilis may be detected by *the Wassermann test* which is dependent on the presence of antibodies and other substances in the blood of syphilitic patients. The question whether certain blood is human, or a particular sausage contains other than pork meat, can be detected—*the precipitin test*. The presence of suppuration can be inferred from the number of phagocytes present—*the phagocyte test*.

The foregoing remarks on immunity refer more particularly to the results of bacterial invasion.

Owing to the practical impossibility of growing pathogenic protozoa outside the body, hardly anything is known about the immunity reactions, as the result of their invasion of the body. In a few instances certain of these reactions have been found useful for diagnostic purposes, but no advances have been made in the direction of treatment on the lines of inducing passive or active immunity by the methods described for bacterial invasion in the previous pages.

Other methods, however, have been devised by which the protozoa circulating in the blood-stream can be killed. These methods are all concerned with the injection, into the circulation of the infected person, of a chemical poison. Their danger lies in the fact that it is extremely difficult to obtain a poison which will be strong enough to destroy the bacteria or protozoa without harming the body-cells and

so either killing the patient or injuring him for life. After many experiments, chemical poisons have been found which can be used with a fair margin of safety and the use of which is justified, considering the terrible nature of some of the diseases.

The chemical poison most in use at the present time is salvarsan or 606, so numbered because 605 preparations were made and discarded before a satisfactory one was discovered, and it is contended that some of its derivatives, such as neo-salvarsan which is numbered 914, are quite safe. In the majority of cases the treatment of syphilis by this chemical poison is said to result in a cure.

Sleeping sickness has been successfully treated by similar chemical substances. Quinine is used as an injection for malaria, and eusol for septicæmia.

ANAPHYLAXIS.

If a person has once been injected with a serum, for instance anti-diphtheritic serum, anti-streptococcic serum or anti-tetanic serum, and is given a second injection on another occasion with the same or some other serum, he or she may develop the condition known as anaphylaxis.

The word anaphylaxis means "against immunity"; that is a condition of supersensitiveness is produced by the first injection which apparently lowers the immunity of that particular individual. Anaphylaxis is a rare complication, and it is not known how long anyone who has had an injection of serum may be liable to it, but cases have been reported in which it supervened six years after the first injection. The liability to its occurrence commences after an interval of ten days from the last injection, there being no danger in repeating the injection if the interval is less than this. Rarely a person may suffer from anaphylaxis who has never before had an injection of serum.

SYMPTOMS AND SIGNS.—

The first indication of anaphylaxis is a swelling at the site of the injection, and this œdema may extend over the

whole body, but as a rule affects the face and eyelids only. A rash may also appear. Rarely acute and grave symptoms such as a rigor, rapid heart-beat, urgent dyspnoea and collapse follow the injection, and death has been known to occur from syncope.

TREATMENT.—

If on some occasion ten days or more after an injection of serum (anti-diphtheritic or anti-tetanic) it is desired to give a person a further dose of the same or another serum, the presence or absence of the anaphylactic state must be ascertained before injecting the full dose. The doctor will thus inject very small doses, say $\frac{1}{2}$ or 1 c.c. at intervals of half an hour for two or three doses. If then no signs of anaphylaxis appear the remainder of the dose is given, and further doses can be given with impunity.

If the complication supervenes the doctor will probably give the patient morphia and atropine, and if necessary artificial respiration will be carried out or oxygen administered.

NURSING.—

When a nurse is informed that a patient is going to be given an injection of serum she should ascertain, if possible, from the patient or her relatives whether she has ever had an injection before and for what purpose. The nurse will then be able to tell the doctor who may have forgotten to ask the question himself, or who had not had the opportunity of interviewing the relatives of the patient.

CHAPTER XIV.

ASCENDING INFLAMMATION.

THE channels of infection are four: the vulva and vagina, the bowel, the urethra, and bladder.

Inflammatory disease of the genital tract is the most frequent cause of sterility in women, and is responsible for more suffering and disablement, and the loss of more lives than any other disease of a gynæcological nature.

The serious danger of infection, of any one portion of the genital tract in a woman, is due to the marked tendency it has to spread to other portions, and as her genital apparatus forms a patent canal, one end of which opens outside her body and the other end into her peritoneal cavity, the great danger to life that may result from such an infection is obvious. Since there is no opening into the peritoneal cavity of the male, inflammation of his genital organs has not the same dangers or disabilities.

Vulva and Vagina.—The infection may spread along the mucous membrane lining the genital canal, when the following diseases may result (Fig. 24):—

Vulvitis	Salpingitis.
Bartholinian abscess	Ovaritis and ovarian abscess.
Vaginitis	Pelvic peritonitis.
Endometritis.	General peritonitis.

If the vagina or uterus is injured then the infection may spread, *via* the lymphatics, through the walls of these organs to the cellular tissue, giving rise to pelvic cellulitis. Lastly, the infection instead of spreading along the mucous

membrane or into the cellular tissue, may extend along the veins of the pelvis giving rise to septicæmia or pyæmia.

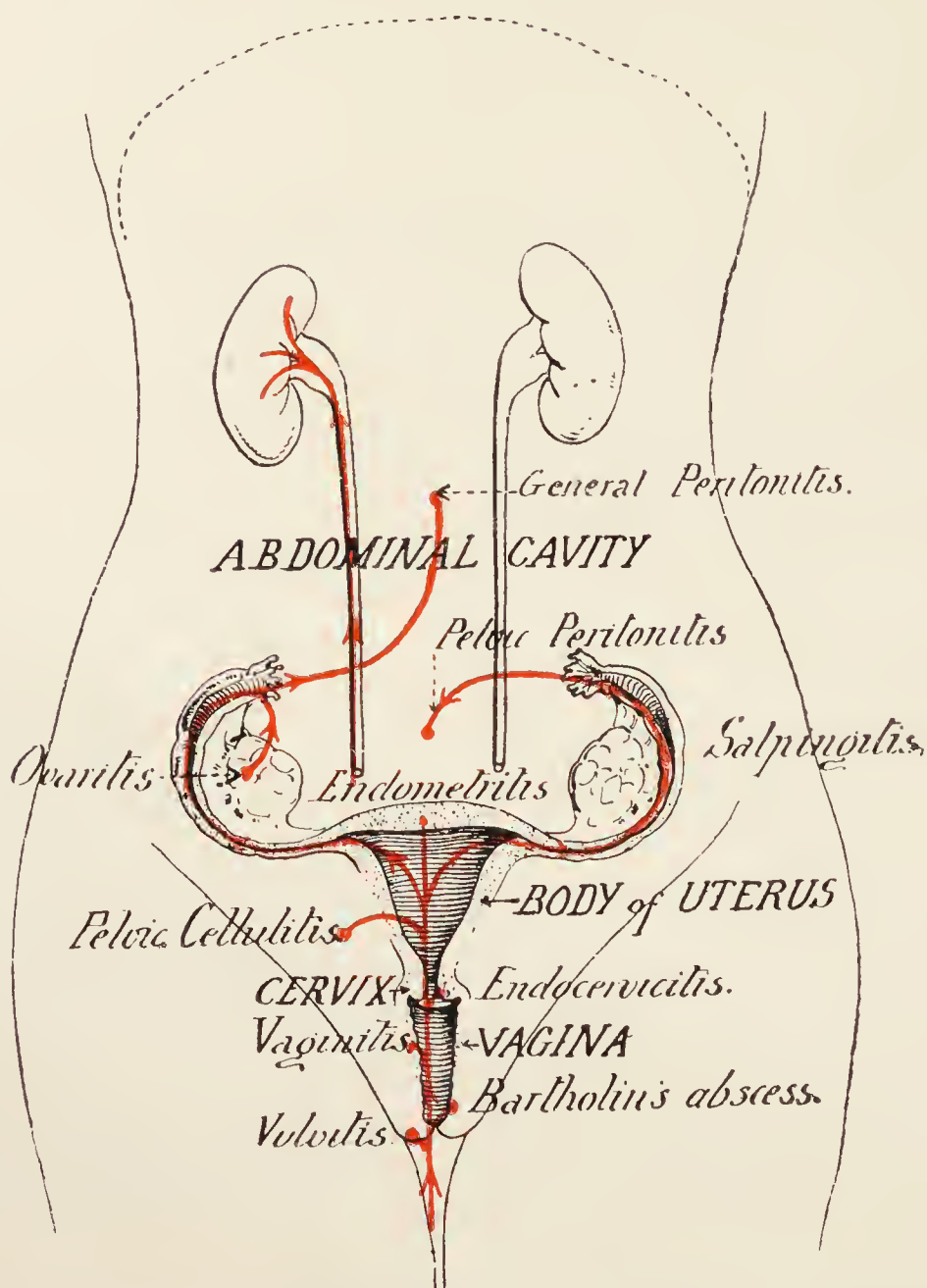


FIG. 24.—Diagram showing the path of infection from the vulva to the peritoneal cavity, and the various diseases that may result. The ureters, cut short, and the kidneys are also depicted showing the path of infection that may result from a cystitis, causing ureteritis, pyelitis and pyo-nephritis.

The inflammation, although it very often does so, need not necessarily start at the vulva or vagina. It may start in the uterus as in the case of puerperal sepsis, when the

placental site or some uterine laceration becomes infected by bacteria spreading from the vagina or vulva.

The Bowel.—An inflamed appendix may infect the right Fallopian tube. The rectum may become adherent to the back of the uterus, a coil of intestine may become adherent to a fibroid tumour of the uterus or to an ovarian cyst as the result of infection *via* the bowel.

The Bladder and Urethra.—Fig. 18 shows the path of infection to the kidney *via* the ureter resulting in pyelitis and pyelo-nephritis. Such conditions are not gynæcological in nature, but are associated at times with diseases of a gynæcological nature, the infection starting in the urethra or bladder.

Vulvitis.

Vulvitis may be acute or chronic.

CAUSE.—

The common cause of acute vulvitis is gonorrhœa. There are other causes such as streptococcal infection, diphtheria, thrush, and the acute specific fevers, but all these in comparison are very rare. Chronic vulvitis may be a sequel of the acute variety; other and commoner causes are those of a very acid or diabetic urine, irritating vaginal discharges, and uncleanness.

SYMPTOMS AND SIGNS.—

A patient suffering from acute vulvitis complains of great pain on walking or sitting and may be unable to do either. The vulva is very swollen, perhaps more on one side than the other, owing to the presence of a Bartholin's abscess, and painful micturition may be complained of owing to an associated urethritis. There is a profuse purulent discharge. The inguinal glands become swollen and painful. The vulvitis of diphtheria and thrush is characterized by the presence of membranes on the vulva, and that of the acute specific fevers by gangrene (*noma pudendi*). In chronic vulvitis the surfaces are red and often eczematous from the scratching due to the irritation.

TREATMENT.—

Frequent warm baths, between which the vulva should be compressed with hot lead lotion fomentations. Douching is inadvisable owing to the certainty that some of the microbes will be carried into the vagina and perhaps therefore infect the rest of the genital tract. In chronic vulvitis due to irritating discharges, constant changes of the pads, extreme cleanliness and the application of an ointment such as equal parts of zinc ointment and castor oil will be found necessary.

Bartholinian Abscess.

CAUSE.—

This is most commonly due to infection of Bartholin's gland by the gonococcus. It may rarely be due to streptococcal infection and sometimes follows an injury to a cyst of Bartholin.

SYMPTOMS AND SIGNS.—

Very great pain on walking or sitting.

Pain, heat and tenderness in the swelling.

Redness and œdema of the parts surrounding the swelling which is in one or other labium majus, or rarely in both.

TREATMENT.—

The abscess will be treated by incision, scraping, and then swabbing its lining with pure carbolic acid. The cavity is then packed with gauze, and the nurse will be directed to apply hot fomentations if there is much œdema.

VAGINITIS.

CAUSE.—

Inflammation of the vagina may be due to—

1. Gonorrhœa.
2. Infection following labour, abortion, or a vaginal operation.
3. Irritation of foreign bodies; commonly a neglected pessary, more rarely a fibroid polypus.

4. The chemicals in an antiseptic vaginal douche being too strong or the water too hot.
5. Acute specific fevers.
6. Advancing years—senile vaginitis.

SYMPTOMS AND SIGNS.—

Feeling of heat and pain in the vagina.

A purulent discharge which may be offensive.

The colour of the lining of the vagina is much redder than normal.

Simple vaginitis is not a very troublesome disease, and a few days' rest in bed, together with vaginal douches, is generally sufficient to cure it.

Gonorrhœal vaginitis, however, is a much more serious condition. Unless efficiently treated, it is dangerous because it may spread up through the uterus into the Fallopian tubes, thence to the peritoneum, and so cause death from general peritonitis—this is rare. More commonly the inflammation stops at the Fallopian tubes, the salpingitis perhaps terminating in a pyosalpinx. In fact, after sepsis following labour or abortion, gonorrhœa is by far the commonest cause of salpingitis and its attendant ills.

There are some marked differences in the symptoms and signs between a simple and gonorrhœal vaginitis, and from these alone a very shrewd idea may be gathered as to the cause (see page 206).

TREATMENT.—

Apart from dealing with the cause itself, which will be the duty of the doctor, the nurse will be directed to give douches or to insert tampons or suppositories into the vagina.

ENDOMETRITIS.

Inflammation of the lining membrane of the uterus is, in all cases, the result of bacterial infection. As a rule the organism is a streptococcus or the gonococcus, but the infection may be due to other bacteria.

The disease may be acute or chronic, the latter variety resulting from an acute attack, or being chronic from the first.

CAUSE.—

In nearly all cases the inflammation is due to puerperal or gonorrhœal infection, or to infection following an operation upon the vagina, the bacteria gaining entrance into the interior of the uterus. Puerperal infection is the commonest. More rarely endometritis may occur as a complication of one of the zymotic diseases. Chronic endometritis with an erosion of the cervix also occurs in virgins, the condition being due to a lowered resistance facilitating the upward growth of septic microbes which are always present in the lower part of the vagina or on the vulva.

SYMPTOMS AND SIGNS.—

In the acute puerperal variety the symptoms are of great severity. The temperature rises rapidly and there may be a rigor accompanying it. The pulse-rate is quick, and the patient is very ill and complains of abdominal pain. There is a purulent discharge. The further symptoms depend upon the progress of the case, for the infection may not remain localized but may spread to the cellular tissue or peritoneum, and septicæmia not infrequently results.

If the endometritis is due to a gonorrhœal infection the general symptoms are, as a rule, not so severe. There is a profuse purulent discharge, which is very irritating, and an increase in the amount of menstrual loss, while menstruation often becomes irregular.

The chief symptoms of chronic endometritis are those of menorrhagia, leucorrhœa and backache.

TREATMENT.—

The treatment of acute endometritis will depend partly on the nature of the infecting organism.

Chronic endometritis is generally treated by curettage, though not, unfortunately, always successfully.

CHRONIC METRITIS OR FIBROSIS UTERI.

This is a condition of the uterus due to infection, in most cases following labour or abortion but not necessarily so; and in about 5 per cent. of cases there is no indication, of any kind, that the cause was bacterial. It is not a particularly uncommon condition.

SYMPTOMS AND SIGNS.—

Dysmenorrhœa and excessive menstrual hæmorrhage are the most striking symptoms and the uterus is enlarged. The loss at the period gradually increases and at length is so great that the patient is permanently invalided.

TREATMENT.—

The treatment by drugs and by curetting is simply a waste of time and money, although, as a rule, drug after drug is tried and the curetting is repeated. The reason why such treatment is useless is because the muscle of the uterus has been largely replaced by fibrous and elastic tissue. Normally menstruation is accompanied by contractions of the uterus by which means the flow is gradually stopped. In chronic metritis the deficiency of muscle leads to very inefficient contractions and so the loss continues much longer till clotting takes place. Formerly the only proper treatment for this condition was by hysterectomy. Nowadays it is cured by the insertion of radium into the uterus.

SALPINGITIS.

Of the serious diseases that are peculiar to women, salpingitis, or inflammation of the Fallopian tubes, occurs most frequently. In such cases the ovaries are almost always involved, and in them the inflammation may go on to pus-formation so that an ovarian abscess results. If the abscess in the ovary communicates with the Fallopian tube, as it most often does, the condition is called a tubo-ovarian abscess.

CAUSE.—

Sepsis following labour or abortion ; gonorrhœa ; the use of dirty instruments (sounds, dilators) ; sloughing fibroids ; cancer of the uterus ; tubercle.

The large majority of cases are due to the first two causes.

Salpingitis is much commoner among the poor than the rich. In fact, it is a comparatively rare disease among the well-to-do, the reason being obvious.

The disease is due to a microbe, which in most cases first causes an endometritis and then infects the Fallopian tubes. The tubes may then become merely inflamed (salpingitis) or their abdominal opening may become closed, and pus collect (pyosalpinx).

The inflammation often spreads from the Fallopian tubes to the surrounding structures and, rarely, acute general peritonitis may supervene with a fatal result.

More commonly the intestine, ovary, and uterus become bound together and fixed by adhesions due to local peritonitis, and because of these adhesions, the removal of the Fallopian tubes, later on, may be very dangerous and difficult.

SYMPTOMS AND SIGNS.—

The symptoms depend mostly on whether the condition is acute or chronic.

Acute.—In this instance the onset is sudden, the temperature rises to a high degree (103° F. or more), the illness may be ushered in by a rigor, the patient complains of severe abdominal pain, and the abdomen is distended and very tender. The abdominal symptoms are due to the infection spreading from the Fallopian tube before its fimbriated end is sealed by the inflammation.

Chronic.—The chronic cases are much the commoner. In these the inflammation gradually spreads through the walls of the Fallopian tube, the abdominal opening having been closed. The patient complains of menorrhagia, metrorrhagia, dysmenorrhœa, leucorrhœa, painful defæcation, and

perhaps a frequency of micturition. Salpingitis is a very common cause of sterility or of one child sterility. It is for this reason that prostitutes so seldom become pregnant.

A usual history in cases of salpingitis, especially when there is pus present, is that the patient has for years been living the life of a semi-invalid, and hardly, if ever, feels quite well, is unable to do much work, and any extra exertion is likely to bring on what she calls an attack of "inflammation of the bowels," for which she has to go to bed for a few days. These attacks, which gradually in-

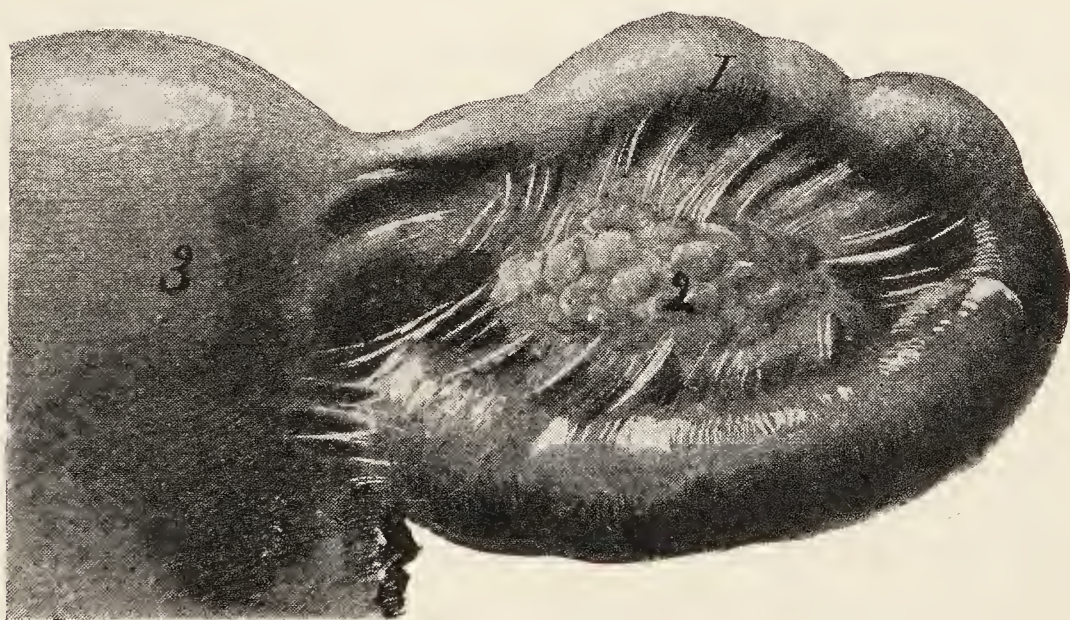


FIG. 25.—Diseased Fallopian tube. Salpingitis. 1. Fallopian tube distended and matted with adhesions; 2. Ovary; 3. Uterus.

crease in frequency, are due to the fact that microbes have escaped from the Fallopian tube and are setting up fresh inflammation.

A pyosalpinx may in some cases reach the size of a banana or even larger and may rupture into the abdominal cavity and cause general peritonitis, or it may rupture into the rectum, bladder, or vagina, giving rise to great misery.

TREATMENT.—

In the acute variety when general peritonitis is present, in addition, an operation must be performed and the diseased

tubes removed. If the peritonitis is only local many authorities think it is safer to wait till the inflammation has quieted down before operating.

The treatment of the chronic form will depend upon the history and the condition found on local examination. If there have been several attacks of inflammation, then the surgeon will certainly decide to operate.

OVARITIS, OVARIAN ABSCESS.

The ovary may be infected directly by organisms passing through the Fallopian tube or indirectly from a salpingitis or diseased appendix. The infection may be so acute that an abscess forms in the ovary. This abscess may communicate with the Fallopian tube, in which case a tubo-ovarian abscess is formed.

As far as the nurse is concerned, the signs, symptoms, sequelæ, and treatment are those of salpingitis.

GENERAL PERITONITIS.

For the description of this condition, which may be due to the same causes as those mentioned under pelvic peritonitis, the reader is referred to page 402.

PELVIC PERITONITIS.

Pelvic peritonitis signifies inflammation of the peritoneum which lines the pelvic cavity and covers the organs contained therein.

CAUSE.—

The peritoneum may become infected by direct extension along the genital canal, the commonest causes of which are septic infection following labour or abortion, and gonorrhœa. Other rarer causes are sloughing fibroids and cancer.

The pelvic peritoneum may also become directly infected by a diseased vermiform appendix.

SYMPTOMS AND SIGNS.—

In the acute stage the patient has very great abdominal pain, and is unable to bear the weight of the bedclothes. She has the symptoms of fever, and often complains of great pain on micturition, due to the movement of the inflamed peritoneum covering the bladder, which may on occasions cause retention of urine.

The abdomen is distended, rigid, and tender. The breathing is thoracic, and the patient lies with her legs drawn up. The temperature and pulse-rate are raised.

RESULTS.—

1. The disease may end in absorption of the inflammatory products, and complete recovery.

2. An abscess may form, and after a severe illness, unless properly treated by operative measures, the pus escapes by ulceration into the bowel, bladder, or vagina. More rarely, the patient dies.

3. The inflammatory products may become organized into fibrous tissue (adhesions), which bind together the pelvic viscera, and cause trouble for years after. A common termination.

TREATMENT.—

Hot douches, abdominal fomentations, and drugs to relieve the pain and regulate the temperature may be prescribed.

With the knowledge, however, that pelvic peritonitis is generally due to appendicitis or salpingitis, most surgeons operate forthwith, with the result that many lives are now saved which were formerly sacrificed.

PELVIC CELLULITIS.

CAUSES.—

Inflammation of the cellular tissue of the pelvis is nearly always due to infection of some wound caused by labour, generally a laceration of the cervix: it may follow an operation on the genital organs.

SYMPTOMS AND SIGNS.—

These correspond to those of pelvic peritonitis, but in an average case they are not so severe. Moreover, the tenderness and abdominal pain is much more local, occurring on one or other side just above the groin, and it is in this situation in cases following labour, that a hard swelling appears.

RESULTS.—

1. The disease may end in absorption when the patient recovers without any bad symptoms.

2. In at least half the cases an abscess results, which, if not opened through the abdominal wall, bursts after about two months, as a rule, just above the groin in which case the patient will not be well for four or five months.

3. Organization may result when the inflamed tissue becomes fibrous, and fixing the uterus may cause trouble for years after.

TREATMENT.—

Cases of pelvic cellulitis are treated by the palliative measures indicated under pelvic peritonitis. When there is any indication that pus is present an incision will be made at the appropriate spot.

CYSTITIS.

Inflammation of the bladder has a distinct interest for nurses, since by carelessness they may be the cause of it.

CAUSE.—

Cystitis is due to a variety of causes in all of which bacteria are the infecting agents. These bacteria may reach the bladder from a diseased kidney, through the bloodstream, or by way of the urethra.

Bacteria being conveyed to the retained urine decompose it, and the ammoniacal urine then lowers the resistance of the mucous membrane so that the bacteria are able to inflame it.

A common cause of cystitis is retention of urine.

The nurse must never forget the great danger, to the patient, of passing a catheter which has not been rendered aseptic by boiling.

Cystitis may be acute or chronic.

Acute Cystitis.—

SYMPTOMS AND SIGNS.—

The patient complains of pain in the perineum and over the pubes. The bladder is very irritable owing to its inflamed mucous membrane. Directly, therefore, urine commences to stretch the bladder, pain results and there is a desire to empty it at once. The contraction of the bladder necessary to empty it brings about further pain. The patient thus suffers from great frequency of micturition accompanied by very severe spasmodic pain. The symptoms of fever are present, more or less severe.

The urine is alkaline, and contains blood and pus. It is extremely offensive, the odour resembling that of decomposing fish.

TREATMENT.—

The patient must be kept in bed, hot fomentations may be applied to the lower abdomen, and she must be encouraged to drink large quantities of barley water. Among other measures prescribed may be that of washing out the bladder (see page 274).

Chronic Cystitis.—

Chronic cystitis is more common than the acute variety.

SYMPTOMS AND SIGNS.—

The patient has a constant desire to pass water and does so several times during the day and night. As a rule there is no pain to speak of.

The urine is alkaline, offensive, and contains a variable amount of mucus and pus which settles as a deposit on standing.

There is a variety of cystitis due to infection with the

bacillus coli, which at times supervenes after an abdominal section. In these cases the urine is acid and there is often a trace of pus present (see page 404).

Results of Cystitis.—

Cystitis is a dangerous condition because of the possibility of the infection spreading up to the kidney by way of the ureters, giving rise to pyelitis (inflammation of the pelvis of the kidney) or nephritis (inflammation of the kidney substance) which may have a fatal termination.

CHAPTER XV.

SEPTICÆMIA.

SEPTICÆMIA is a disease due to microbes, generally streptococci, gaining entrance to the blood-stream and therein undergoing extremely rapid reproduction. The microbes are able to live and multiply because their surroundings, which are moist, dark and of the temperature of the body, are entirely favourable, while the best food they could wish for is present in the serum of the blood. On the entrance of these microbes into the blood certain white corpuscles of the blood, known as phagocytes, attack them and eat them. Unfortunately, however, unlike soldiers in a battle, the majority of whom survive, these soldiers of the body are killed by the microbe they have eaten. This microbe as it dies elaborates a poison which kills the phagocyte and the latter breaking up, the poison escapes into the blood. The poison is called an endotoxin and being absorbed by the tissues is the cause of the illness of the patient.

SYMPTOMS.—

The patient feels ill, complains of headache and of inability to assume any position that is entirely comfortable, so that turning about from one side to another she is deprived very often of that amount of sleep that is conducive to her recovery. The attack, if the temperature rises suddenly, may be accompanied by the distressing symptom of a rigor which makes the patient very exhausted. If the temperature rises more slowly the initial rigor may be absent, though as the disease progresses repeated rigors, even in the absence of pus formation (pyæmia), may occur,

The patient when not sweating feels hot and dry, and complains of thirst, partly because she may be disinclined to drink as much fluid as she should, and partly because of the profuse sweatings which occur. She complains of feeling weak, and this complaint is intensified as time goes on. She often has a great distaste for food and may complain of terrifying dreams.

SIGNS.—

The patient is restless, her temperature often varies markedly, since in the morning it may be as low as 99° F. and in the evening as high as 104° F., quite apart from the serious rise and fall accompanying a rigor. The pulse-rate is often 100, may rise to 130 or 140, and while at first the pulse is full and bounding, as time goes on it becomes smaller, and its rate more rapid and irregular. She suffers from profuse sweating, apart from the rigors, and may have an irritating heat rash. Her tongue is dry and coated, and either brown and cracked or red and shining, and sordes are apt to collect on the lips. At the commencement of the attack the patient may vomit and this symptom, if the disease is prolonged, may return. Her urine is scanty and high coloured, and if the kidneys are affected will contain some amount of albumin. The loss of flesh is noticeable, and with the disease going from bad to worse the patient becomes listless, sinks down in the bed and is delirious at night. Diarrhœa, a distended abdomen and hiccough may supervene and in themselves are bad signs.

Pyæmia.—During the course of the illness pyæmia, which indicates the formation of local abscesses, may be superadded to the septicæmia. Pyæmia is due to part of a septic thrombus breaking off the clot, and being carried by the blood-stream till at last it arrives at some part in the body where the blood-vessels are too small to allow it to travel any farther. Suppuration then takes place at this spot and an abscess is formed. The commonest sites for such abscesses are in the joints, pleural cavities, and kidneys, as in these situations the vessels are very small.

But abscesses may arise in the subcutaneous tissue or in that between the muscles. The occurrence of the arrest of such an embolism may be heralded by the patient complaining of a sudden pain in some portion of her body, but this is not always so, and an abscess may form without any one being aware of the fact. Pyæmia is generally accompanied by a series of rigors, which, in a few days, are followed by the appearance of abscesses, but not always so, and as already mentioned, the appearance of such abscesses may be very insidious.

TREATMENT.—

At the commencement of a case of septicæmia the doctor will probably give injections of anti-streptococcic serum, unless he is certain that the infective organism is of some other variety, and he may follow this by intravenous injections of some drug. As the case becomes chronic he may try the effect of vaccines, though, as a rule, these are not very successful. If any abscesses form he will open them. Otherwise all his energies will be devoted to keeping up the vitality of the patient with the hope that in the end her body-cells and body-fluids will successfully destroy the microbes.

The treatment of septicæmia depends a very great deal on the nurse, since, as will be seen hereafter, most of the remedies the doctor orders the nurse will have herself to carry out. The subject of diet is dealt with under nursing. Most doctors will prescribe a certain amount of alcohol. The worst case the author ever saw was that of a lady who was removed from a Twilight Sleep Home. She was in bed altogether sixteen weeks. During this time she had repeated rigors, abscesses in several joints of her limbs, which had to be opened, including one which destroyed her hip joint. She had abscesses in the muscles which were opened, an abscess in the upper part of her chest which nearly suffocated her, one eyeball was destroyed and had to be removed, and later she had to have a resection of her hip. This patient was determined to get well, eat every-

thing she was asked to, and drank a bottle of champagne a day and over a bottle of brandy a week. The author is convinced that it was the food and alcohol that enabled her to resist successfully this infection, though some might contend that as regards the alcohol the recovery took place not because of it but in spite of it. At any rate the great pain and collapse following a dressing of the abscesses necessitated the administration of stimulant. Perhaps the alcohol did more good because up to the time of her illness the patient was a teetotaler.

If any abscesses form the doctor will have to open them, and the nurse must be ready with the necessary dressings and appliances, other than those the doctor provides. The bowels will require constant attention as very often these patients are constipated, necessitating the administration of aperients, while on the other hand diarrhœa may supervene, a bad sign, which the doctor will treat, and in these cases the nurse has to be most careful in keeping the patient scrupulously clean, as if the discharges are not carefully removed they will increase the chances of bed-sores very greatly. The doctor will also be called upon to prescribe for headache and sleeplessness.

In some cases one or other of the joints will become inflamed, or some other part of the body, without the formation of an abscess. The pain resulting can be relieved by hot fomentations or turpentine stupes, and if there is inflammation in the pelvis hot douches, 115° F., will be found very useful. The skin on the inner surfaces of the thighs in some women is very tender, and the repeated administration of douches at this temperature will often cause great discomfort or even severe pain and soreness. Such a complication can be avoided by smearing the vulva and inner surfaces of the thighs and buttocks with vaseline or zinc ointment.

NURSING.—

The principal object in the treatment of septicæmia is to make every effort to assist the body-cells and body-fluids

of the patient in their endeavour to modify the disease or destroy the invading bacteria by the production of artificial immunity. As far as the nurse is concerned this means that she must do everything in her power to encourage the patient to take sufficient nourishment, and in this case sufficient nourishment means as much as the patient can take without upsetting her digestion. It is a well-known fact to medical men that, taking all cases, those patients suffering from septicæmia who consume the most nourishment do the best. It may require constant endeavour, much patience and great tact on the part of the nurse to persuade the patient to take the proper amount of nourishment, but in most cases, if the nurse is a good one, this can be done. The doctor will direct the nurse, in the main, what food to give the patient, but the nurse herself should be of the greatest value in this respect, by suggesting various articles of food and changing the diet at fairly frequent intervals.

In the case of an acute illness accompanied by fever the natural functions of the body, including digestion, are upset and it is therefore necessary to give such patients liquid diet of a very digestible character. Moreover, many of the articles given as liquid diet are only stimulating, and have but very little or no nourishing properties. If septicæmia does not lead to a fatal termination in a week or two the patient is in many cases a long time, perhaps several weeks, before she gets well. During this time the patient may have a high and irregular temperature. In these cases patients may have any article of diet, within reason, and, as a rule, they are able quite well to digest solid food of a suitable character.

It is very important that such a patient should sleep well; the ability to take nourishment will favour this, and also the more comfortable the nurse makes her, the more likely she is to get proper rest. The mouth will probably be very dry and dead epithelium is apt to accumulate on the lips. The nurse therefore should be very careful to keep the teeth and mouth as clean as possible by brushing and gently washing them with glycothymoline,

while the patient should be encouraged to wash out her mouth at frequent intervals with some mild antiseptic such as boracic acid lotion. If the lips are cracked a solution of glycerine and borax will be found very useful.

The room must be kept well aired, and as long as the patient is properly protected with screens and kept warm, it is best to have the window open. If possible a room should be chosen into which the sun, if there is any, can penetrate. In the summer, if the patient is well wrapped up and kept warm with well covered hot-water bottles, her bed may be wheeled to an open window, or balcony, or even into the garden where she will get the maximum amount of sun and fresh air.

As septicæmia depresses the resisting powers of the patient very much and she will be a long time in bed, sores are apt to form on the back and especially over any bony prominences such as the sacrum and hip bones, and the nurse must be most constant and energetic in her treatment of these surfaces every day. If possible the patient should have a water bed to lie upon, and the legs should be moved daily as they are very apt to get stiff, and the position of the patient should be changed frequently.

The nurse when she is attending to the patient must be careful to notice, from day to day, whether there is any soft swelling (abscess) in the subcutaneous tissues. The nurse is much more likely to discover such a swelling, which often appears without pain, than the doctor. An early report thereof to the doctor may save the patient much suffering.

The distressing symptom known as a rigor, may leave the patient exhausted. The sudden rise in temperature causes the patient to feel cold and the shivering is very distressing. At this time hot-water bottles and an extra blanket should be provided and the patient should be given a little alcohol in hot milk or water. After the attack has passed off the patient will feel very hot and the hot-water bottles and extra clothing will have to be removed. With the fall of the temperature the patient will perspire profusely. Her nightgown will become wringing wet and perhaps the sheets.

The nurse should make the patient as comfortable as possible by removing her nightgown, carefully drying her body, and putting on a clean nightgown and fresh bed-linen when necessary. If the temperature keeps high the doctor may order the nurse to sponge the patient or give her a cold pack—the method of so doing she will have learned in her general training.

The nurse must remember that if the microbe from which the patient is suffering has a chance of infecting herself, she too may get septicæmia. This will only happen if the nurse is careless in not protecting her hands if she has any scratches on them. The best way to protect the hands is to wash them carefully before and after attending to the patient, soaking them in some antiseptic such as lysol after the washing with soap and water, and to wear rubber gloves if the patient has any abscess discharging or discharge from the genital passages.

The well-being and comfort of a patient suffering from septicæmia and her recovery will be due as much to the attention of the nurse as to that of the doctor. The patient must be kept as cheerful as possible, and much patience and an ability to pay the greatest attention to the smallest details, apart from sound professional knowledge, is required of any woman who undertakes to nurse a patient suffering from septicæmia.

CHAPTER XVI.

SYPHILIS.

SYPHILIS may be acquired, hereditary or congenital. We are here dealing only with the acquired variety.

Syphilis is a contagious disease, and if untreated, or if the right treatment is neglected, may last several years.

It was estimated by the Royal Commission on Venereal Diseases that not less than 10 per cent. of the whole population was infected with syphilis, and that 17 per cent. of the insane persons, 34 per cent. of people blind from birth, and 25 per cent. of persons deaf from birth, owe their affliction to syphilis.

Syphilis is the chief cause of paralytic strokes occurring before middle age; it leads to the birth of diseased children, many of whom die in childhood; it is responsible for a large proportion of still-births, and it is a common cause of softening of the brain.

CAUSE.—

Syphilis is due to infection by the *treponema pallidum*, a bacterium, one of the lowest forms of animal life. The infection may be direct or indirect. If the microbe is implanted in some part of the body of a healthy person by actual contact with an infected one the infection is direct. A person may be indirectly infected by using cups, mugs, spoons, forks, sponges, towels, or other articles, which have been used by an infected person and before they were sterilized. The site of inoculation is usually some part of the genital organs, more rarely the lips, throat or fingers.

COURSE.—

When left untreated, or inefficiently treated, syphilis passes through three stages, known as the primary, secondary, and tertiary. Primary and secondary syphilis are infectious, tertiary not. Between the time of infection and the appearance of the tertiary signs, there are three intervals of time, during which the patient may be unaware that he or she has the disease. During the first two intervals the patient is infectious, during the third generally not.

FIRST INTERVAL.—

Between the date of infection and the appearance of the primary lesion. This is called the incubation period and averages from three to five weeks, more often the latter.

SECOND INTERVAL.—

Between the development of the primary lesion and the appearance of the secondary lesions. During this period, which averages four to eight weeks, the disease is becoming disseminated through the system.

THIRD INTERVAL.—

Between the disappearance of the secondary lesions to the appearance of the tertiary, during this interval, which varies from three to many years, the disease has become chronic.

Primary Syphilis.

SYMPTOMS AND SIGNS.—

The first symptom generally noted is irritation at the site of infection; in the large majority of cases in women this is the vulva. As a rule there is no pain or inflammation.

SIGNS.—

At the site of infection a small, round, copper-coloured ulcer appears, called a hard chancre. This takes two to three weeks to become fully developed and three to five weeks to disappear. The ulcer has a greyish base, its edges are raised, and there is marked hardening of the

tissues, or induration as it is termed, round the chancre, which feels like a small button inserted just below the surface of the skin.

The commonest sites for the appearance of the hard chancre are in the female the labia, then the cervix and the vagina; nevertheless a hard chancre may be found on any part of the body where there is a crack and the treponema has gained entrance. Thus it may be found on the lips and mouth of an innocent person who has been kissed by an infected person, or has used an infected glass, fork, spoon or pipe; or upon the finger of a doctor or nurse who have not taken proper precautions when examining or nursing a patient suffering from this disease.

In about fourteen days the lymphatic glands which drain the site of the primary infection become enlarged and hard, but are painless.

It must be remembered, however, that the primary sore in a woman often escapes detection, because it frequently disappears without its presence having been noticed, and when situated on the labia, vagina or cervix, even if it is detected, it more often than not fails to present the typical features of a hard chancre, the base not being indurated. Labial chancres may be multiple due to infection of the opposed surface.

DIAGNOSIS.—

If the secretion from a syphilitic lesion of the primary or secondary stages is examined under the microscope by dark-ground illumination the treponema pallidum can be detected. The diagnosis may also be determined by an examination of the blood, the test being known as the Wassermann reaction. As such a reaction may not be obtained until the disease has become generalized, this method of diagnosis is less reliable in the early stages. The Wassermann test is, however, of great value as an aid to diagnosis in the case of women who have had many miscarriages and perhaps no other sign of the disease.

Secondary Syphilis.

SYMPTOMS AND SIGNS.—

The patient complains of loss of appetite, sore throat, pains in the bones and muscles, and a general feeling of weakness.

The following symptoms and signs may be, but all of them need not be, present. In fact the indications of this stage may be so slight that they entirely escape notice, the woman may not be aware of the affected lymphatic glands, and the most common and first rash to appear being more of a red flush and lasting only a short time, its presence may pass unnoticed. At the onset there is fever. The patient is anæmic, her throat is red, and on her tonsils and mucous membrane of the mouth can be seen greyish-white patches, known as *mucous tubercles*. Similar patches, but rather more raised and moist, may be found in the region of the vulva and anus and are then known as *condylomata*, and of the secondary manifestations in women these are the most frequent and typical. It is very important to realize that these lesions are most infectious, and patients suffering from secondary syphilis are particularly liable to spread the disease by indirect contagion. The lymphatic glands in various parts of the body become enlarged, the hair falls out and the nails become brittle and may ulcerate. Rashes simulating every form and variety of skin disease may make their appearance. There is no itching with these rashes, which assume a raw ham-coloured hue. Inflammation of the iris, and of the bones and joints may also occur.

Tertiary Syphilis.

This stage is predisposed to by overwork or alcoholic excess, and is much more likely to ensue when the treatment in the early stages has been neglected or insufficient.

SYMPTOMS AND SIGNS.—

The patient feels very ill and further symptoms and signs will depend upon the part of the body affected.

Tumours, known as gummata, may appear in any part of the body and lead to the destruction of tissue in their neighbourhood.

Ulceration of the face may occur leading to a frightful disfigurement. The bones may be eaten away.

The heart and large blood-vessels may become attacked, and thousands of people die of heart disease and aneurysm every year, their death being due to an infection with syphilis, years before.

The nervous system, brain, and spinal cord is particularly susceptible to the poison. Blindness and epilepsy may be due to syphilis, and one of the most fatal forms of insanity is due to this disease, namely, general paralysis of the insane. Thus 15 per cent. of all male admissions and 2·3 per cent. of all female admissions to lunatic asylums are due to this form of paralysis.

Locomotor ataxy, a very common and most painful disease of the nervous system, is due to syphilis.

TREATMENT.—

Syphilis can be cured if promptly and systematically treated. The disappearance of the outward evidence of the disease after treatment has begun is not certain evidence that the disease is cured. *Neglect of treatment in these circumstances may be highly dangerous. Treatment should not be stopped until an expert says this is safe.* It is only by following such advice that the terrible complications mentioned under tertiary syphilis can be avoided. Treatment must be commenced early and continued, perhaps, long after all outward signs of the disease have disappeared.

During treatment the teeth should be cleansed night and morning. Treatment may have to be stopped if the mouth is not kept clean. The patient should dress warmly, live simply, and avoid wine, beer, and spirits.

If after treatment has been stopped, rashes on the skin, sore throat, or any other evidence of ill-health appears, a doctor should at once be consulted and informed of the previous treatment. *This is extremely important.*

A person who has had syphilis should not marry unless a doctor, after going fully into the facts, states that he or she is cured ; otherwise the disease will probably be given to the wife or husband and any children they may have.

The treatment of syphilis in the primary and secondary stages consists in the injection into the blood, through a vein, of a solution of arsenic compounds, either salvarsan or N.A.B. which kills the spirochæte. In addition mercury in some form is given, the progress of the cure being determined and controlled by examination of small quantities of the blood of the patient. The nurse must always remember the highly contagious nature of syphilis in its primary and secondary stages. She must therefore, while she is attending a patient afflicted with this disease, wear an overall and india-rubber gloves, which should be boiled before and after use, otherwise if she has the slightest abrasion on her hands or fingers she may become infected. The spoons, forks, knives, glass, crockery, sponges, towels, bed-pans, or other articles used by the patient should all be kept for her separate use, and should never be removed from the room until they have been boiled or soaked in a strong disinfectant, for such articles being contaminated may easily be the source of disease in others. For a similar reason such a patient should not be allowed to kiss any other person or marry until the disease has been cured. It has been stated that in more than half the cases syphilis has been contracted innocently.

The treatment should be carried out by an expert ; that prescribed by chemists, herbalists and quacks is one of the most fertile causes of the terrible sequels to syphilitic infection.

GONORRHŒA.

CAUSE.—

Gonorrhœa is due to infection by the gonococcus, one of the lowest forms of vegetable life, either directly by sexual connexion with an infected person or indirectly by contact with infected towels, bedding, or other articles.

The incubation period is from one to ten days, usually three or four.

SYMPTOMS AND SIGNS.—

As a rule, the disease first affects the urethra or cervix, the vulva being infected secondarily. The vagina in adults generally escapes, its epithelium being too tough for the gonococcus to penetrate. In an acute case the external genital organs are inflamed and swollen and very tender so that the patient is unable to walk or sit with any comfort. In addition she will complain of a profuse yellow discharge, of pain in her groins, due to involvement of the lymphatic glands and of pain on micturition.

The lymphatic glands in the groin may suppurate. Such acute cases are not common, and, more especially if the cervix alone is involved, the only indication may be a slight discharge.

DIAGNOSIS.—

The disease is diagnosed by the detection of the gonococcus in the discharge. Unless, however, the discharge is examined in an early stage of the disease, the presence of this organism may escape detection. The reason for this is that the gonococcus finds it very difficult to remain for any length of time in the vulval or vaginal tissues owing to the toughness of the epithelium covering these structures, and the organisms are therefore soon swept away by the inflammatory discharges and the vaginal douches which have most likely been employed before the patient sought advice. The organisms, however, may remain in the cervical glands, or in those of Bartholin for a long time, without there being any indication of their presence, in other words the woman is a "carrier."

Apart from the detection of the gonococcus there are a few points in the history, symptoms, and signs of this disease which are extremely suggestive:—

Thus if the attack commenced suddenly, if the inflammation is very acute and the discharge profuse, if there is pain on micturition and the lymphatic glands in the groins are

swollen and tender, the vulvitis or vaginitis will almost certainly be of gonorrhœal origin.

RESULT.—

Unless gonorrhœa is treated in its early stage and efficiently, it becomes chronic. A large number of patients, especially those of the female sex, being unaware of their condition, do not seek medical advice till the disease has been present for some time and has had an opportunity to spread. In this way the disease may spread from the vulva or cervix to the body of the uterus, Fallopian tubes, ovaries, and pelvic peritoneum, and rarely to the general peritoneum, or it may spread *via* the urethra to the bladder, ureters, and kidneys.

The blood may become infected with the gonococcus, in which case gonorrhœal rheumatism, septicæmia, or ulcerative endocarditis may result. If the organism contaminates the mucous membrane of the eyelids, gonorrhœal ophthalmia supervenes, which may easily destroy the eyesight.

Gonorrhœa may be the cause of puerperal fever, and one of its commonest complications is an abscess of Bartholin's gland.

The most common of the serious conditions of a gynæcological nature found in women is that of inflamed ovaries, Fallopian tubes, and pelvic peritoneum, bound together, forming one mass to which the term salpingo-oophoritis is applied. This complication is a cause of great misery and of more or less disablement, besides being responsible for a large percentage of the major operations of a gynæcological nature performed on females. Gonorrhœa, in fact, is a much more serious disease than is usually thought, and is harder to cure than syphilis. It is responsible for a large proportion of the total number of cases of sterility in women and of two-thirds of the cases of blindness from birth.

TREATMENT.—

Gonorrhœa can be cured by early and skilled treatment. Rest in bed is absolutely necessary, and in the majority

of acute cases the patient will be ordered to sit in a hot bath, three or four times a day, for twenty minutes, between which hot fomentations of lead will be applied to the vulva. In a few days, when the vulva and vagina are less tender, hot douches containing some mild antiseptic will be prescribed.

As the danger of the disease spreading is so great, especially in women who have borne children in whom the cervical canal is more or less open, and as its results may be so disastrous, the best treatment, after the acute stage has subsided, is to paint the vagina with one of the many preparations of silver, such as silver nitrate, protargol or argyrol, all vaginal discharge being first thoroughly removed by cotton-wool swabs. After the silver preparation has been applied a cotton-wool tampon soaked in one of these remedies is introduced into the vagina and left there for eight hours. In some cases, because of the tenderness, an anæsthetic has to be used for the first treatment. If there is any evidence that the urethra is involved similar application may be made to this canal by means of a Playfair's probe and also, if need be, to the cervical canal.

The nurse must be most careful to use every precaution when nursing a case of gonorrhœa, lest she convey the disease to herself or some other person. Extreme cleanliness is necessary; thus she should wear an overall and india-rubber gloves, all dressings which have been in contact with the discharge should be burnt, soiled linen should be dipped in carbolic solution 1 in 20, and bed-pans and the douche apparatus should be thoroughly cleansed and sterilized after use. Many epidemics of gonorrhœa have arisen in families through children using the same towels as their infected mother, and in institutions through the use of towels or utensils which have been contaminated in the first place by some adult.

Gonorrhœa is a contagious disease. So long as there is any discharge, however slight in amount, no matter how long it has lasted, the patient is liable to convey the disease to others.

During treatment condiments must be avoided and large quantities of barley water should be drunk. Indulgence in alcoholic drinks seriously interferes with the efficiency of treatment and often brings back the discharge after apparent recovery.

Gonorrhœal Warts of the Vulva.—These warts, caused by the long-continued irritation of the discharge in chronic cases, may become infected, when ulceration results, the discharge being horribly offensive. They will disappear if the discharge causing them is cured, and their surface is kept dry with a dusting powder containing calomel and zinc oxide.

SOFT SORE.

CAUSE.—

The soft sore results from infection by a bacillus. It is purely a local affection and remains so.

SYMPTOMS AND SIGNS.—

Within five days of infection the patient will complain of pain, heat in, and a profuse discharge from the vulva.

A sharply cut deep ulcer appears, the surface of which is greyish-white. More than one soft sore may be present, opposite sides of the vulva being commonly affected. The ulcers secrete a purulent discharge. The lymphatic glands in the groin become enlarged, inflamed, and painful.

TREATMENT.—

Soft chancres are cured by local treatment. The nurse must take every precaution when attending to these cases.

Venereal disease is responsible for so much ill-health and so many deaths that "Centres" are now to be found in all large towns where patients can obtain free advice and treatment by doctors specially qualified for this purpose.

The Nursing of Venereal Diseases.

When nursing patients suffering from gonorrhœa, soft sore, or syphilis, the nurse should realize that infection is

only by actual contact with the sore or discharge. The routine methods of disinfection and precaution practised when nursing septic patients will therefore, if conscientiously carried out, protect the nurse from any risk of infection. Moreover, when attending a patient known to be suffering from one or other of these diseases, the nurse will have the added safeguard of being aware of the danger, instead of dealing with it, all unrecognized, as so frequently happens, in the many obscure ways in the general wards.

The nurse should bring to her work a large amount of sympathy, which she should seek to make practical by a wider understanding of the social conditions that are to a great measure accountable for this social evil.

Many women are innocent victims and call for the tenderest pity; others fall victims through the temptations and dangers to which unprotected girls are exposed, the lack of home discipline, their ignorance of ethics, the grey-ness and hardships of their struggling lives.

The nurse will thus treat these unfortunate sufferers who are under her care with a wise compassion that will give ready and sympathetic help when required, and should exert a quiet influence that will strengthen their moral nature and restore their self-respect.

With practical common sense, the nurse may lead women suffering from these diseases to realize the danger to the community of their condition and the terrible consequences to innocent lives. A nurse has here a great mission and a real duty to her sex, her country, and the world at large.

The nurse must never express the opinion or even hint that her patient has venereal disease. By so doing she may expose herself to legal action.

CHAPTER XVII.

TUMOURS AND NEW GROWTHS.

TUMOURS of the genital organs may be cystic or solid, and these in their turn are innocent or malignant. The seat of cystic tumours is most commonly the ovaries, while that of tumours which are solid is generally in the uterus.

Cystic Tumours.—Cystic tumours are found :—

In the vulva as Bartholin's cysts.

In the vagina as vaginal cysts.

In the ovaries as ovarian cysts.

In the uterus as fibroids which have undergone cystic degeneration.

In the Fallopian tubes as a hydro-salpinx, pyo-salpinx, or hæmato-salpinx.

Cysts of the ovary are either innocent or malignant. The remaining cysts mentioned are innocent in nature.

Solid Tumours.—A solid tumour may be found in any of the genital organs, when it is known as a fibroma, adenomyoma, carcinoma, or sarcoma.

A fibroma, or fibroid, is composed of fibrous tissue with a small amount of muscle.

An adenomyoma is a solid tumour composed of muscle, glands, and connective tissue. Endometrioma is the name given to certain varieties of this growth.

A carcinoma is a malignant tumour, and when composed of squamous epithelial cells it is known as a squamous-celled carcinoma, and when of columnar epithelial cells it is called a columnar-celled carcinoma (glandular-carcinoma or adeno-carcinoma).

A sarcoma is a malignant tumour composed of cells of connective tissue.

In addition the uterus may be the seat of tumours called polypi which may be composed of fibrous tissue and muscle, the fibroid polypus; of glandular tissue, the mucous polypus; or of placental tissue, the placental polypus.

VULVA.

The commonest tumours of the vulva are a Bartholin's cyst, urethral caruncle, and carcinoma, and these only will be dealt with.

Bartholin's Cyst.

The commonest cyst of the vulva is known as Bartholin's cyst, from the name of the anatomist who first described the gland that is affected.

CAUSE.—

The duct leading from Bartholin's gland becomes obstructed as the result of inflammation, and the mucous secretion being unable to escape, accumulates in the gland, and converts it into a cyst.

SYMPTOMS AND SIGNS.—

Discomfort in sitting or walking, and pain. The swelling is situated in one or other labium majus, just posterior to the corresponding labium minus, and may attain the size of an unshelled walnut. In some cases, either from gonococcal infection or injury, the cyst becomes inflamed and suppurates, a condition known as a Bartholinian abscess.

TREATMENT.—

The whole of the cyst wall must be dissected out, otherwise if it is only incised the condition may recur.

Urethral Caruncle.

A urethral caruncle is a small growth at the orifice of the urethra.

CAUSE.—

The cause is not known, but the evidence is in favour of its being due to infection of a small gland at the entrance

of the urethra. It occurs most commonly in middle-aged married women.

SYMPTOMS AND SIGNS.—

The patient may not know of its existence or she may complain of pain on micturition or when the caruncle is touched.

Projecting from the orifice of the urethra will be seen a bright red growth generally about the size of a split-pea, and resembling a miniature cockscomb. It is composed of small blood-vessels and veins and connective tissue and is covered with epithelium. Caruncles vary in their sensitiveness, some are exquisitely tender, others can be touched without the patient feeling any pain. A few bleed on being touched.

TREATMENT.—

The urethral caruncle is removed by excision and cauterization, and unless it is entirely removed it is apt to return.

Leukoplakia Vulvæ.

Leukoplakia vulvæ, being a chronic inflammatory condition of the vulva and adjacent skin, should be included under the section dealing with infection. As, however, this disease is always a precursor of cancer of the vulva it is dealt with here.

CAUSE.—

The cause is not known. It occurs most frequently in married women at or about the menopause.

SYMPTOMS AND SIGNS.—

The most marked symptom of leukoplakia is itching of the vulva which may be very intense and persistent. As the disease progresses the patient will complain of local pain due to the formation of one or more ulcers or fissures.

When well developed, leukoplakia can be diagnosed without much difficulty by a nurse. The whole of the vulva, except the vestibule, may be attacked. The inner

surfaces of the labia majora are smooth as if ironed out, and have the appearance of being covered by a thin layer of milk. The colour is parchment-like. In addition, when the disease is more advanced, fissures or small ulcers may develop which are very tender. In a large number of cases, if the disease is not arrested, malignant disease supervenes.

TREATMENT.—

The nurse should counsel the patient to seek medical advice at once, because if the disease is efficiently treated the complication of malignant disease will be avoided.

For slight cases, the treatment will consist in the application of various lotions and ointments. If one fails another may succeed. The application of X-rays will at times lead to a cure.

When in spite of such treatment the disease is persistent, and especially if ulcers or fissures are present, the affected area should be excised so as to prevent cancer supervening. In fact, many authorities maintain that leukoplakia should always, in the first instance, be treated by excision.

Cancer of the Vulva.

As a rule cancer of the vulva first appears when the woman is between fifty and sixty years of age.

SYMPTOMS AND SIGNS.—

The first symptom noticed is pruritus. Later when the growth ulcerates there will be pain, bleeding, and an offensive discharge. Towards the termination of the disease additional symptoms will be associated with the bladder and rectum, due to ulceration into these organs by the growth. What with the loss of sleep from the pain, anæmia from the bleeding, septic absorption from the ulceration, and inability to take food, patients in the last stages of this disease are the subjects of abject misery.

The disease first commences as a nodule most commonly on a labium majus more rarely on the clitoris. Prior to the appearance of this nodule the vulva has in nearly all

cases, if not all, been affected with leukoplakia. . Later the cancer ulcerates and the glands in the groin enlarge.

In the last stages ulceration spreads over the vulva on to the groins, abdomen, and thighs. The bladder and rectum may be involved with resulting fistulæ, or the growth may obstruct the urethra causing retention of urine.

TREATMENT.—

The patient should consult a medical practitioner at the earliest moment, with a view to having the growth removed, with, in addition, the inguinal lymphatic glands. Treatment by X-rays and radium may ameliorate the disease and perhaps in some cases cure it.

Unfortunately from ignorance of the presence of the growth, carelessness, or disinclination of the woman to seek advice, carcinoma of the vulva does not come under the care of the gynaecologist in its early stages. The nurse should always advise a patient suffering from leukoplakia, which is not difficult to diagnose, to seek medical advice.

There are other swellings of the vulva, some of which are not uncommonly found. Although not tumours in the generally accepted sense of the term, they will be described under this section as they form swellings.

Hæmatoma of the Vulva.

CAUSE.—

A hæmatoma of the vulva is caused by an extravasation of blood due to the rupture of some vessel by a kick or fall, or by the pressure of the foetal head during delivery.

SYMPTOMS AND SIGNS.—

There will be a history of injury.

The swelling is tender and discoloured and may be in any part of the vulva. Rarely it suppurates.

In labour a hæmatoma of the vulva may form a serious obstruction to the birth of the child,

TREATMENT.—

The doctor will order cold lead compresses to be applied to the swelling, and on occasions will incise it and evacuate the blood-clot.

Inguinal Hernia.**SIGNS.—**

This is characterized by a swelling which appears at the anterior end of the labium majus.

It disappears when the patient lies down.

There is probably an impulse on coughing.

The swelling, as a rule, can be pushed back into the abdominal cavity and kept there by a truss. Occasionally the bowel gets nipped and gives rise to symptoms of strangulation, which if not relieved will kill the patient.

TREATMENT.—

The condition should be cured by operation unless the patient is not fit for such treatment, when a truss will have to be worn.

Varicose Veins of the Vulva.**CAUSE.—**

Pressure, of pregnant uterus or of an abdominal tumour, on the veins of the pelvis.

SYMPTOMS AND SIGNS.—

This condition is easily identified, and, as a rule, it does not cause much trouble, except an aching and occasionally pruritus.

Varicose veins, however, may be a source of great danger if they burst, since the woman may bleed to death before help can be obtained.

During pregnancy the veins may become very enlarged forming cords the size of the little finger, stretching up on to the abdomen and down on to the thighs, and in some cases obscuring the vulva.

TREATMENT.—

Labour may have to be terminated prematurely, lest the veins should cause an obstruction during labour, or burst. In the non-pregnant woman the varicose veins must be excised if they cause trouble.

UTERUS.

The commonest tumours of the uterus are a fibroid, an adenomyoma, a polypus, and cancer.

Fibroid Tumours.

Exactly how often the uterus of a woman is the seat of a fibroid tumour it is difficult to say. Authorities vary in their estimates, but the statistics of the dead-house show that 40 per cent. of women over fifty years of age have fibroid tumours.

These statistics, however, include small fibroids not larger than a pea which never cause their owner any trouble, and which are only found on the routine inspection of the operating or post-mortem room.

Fortunately in the large majority of women, whose uteri are thus affected, the tumour is small, symptoms are absent, and its presence remains undetected.

On the other hand, both by growth and by changes taking place in them, fibroids may be directly responsible for the termination of life. The majority of fibroids giving rise to symptoms first cause trouble between the ages of thirty and forty-five.

According to their position fibroids are classified as: pedunculated-subperitoneal, subperitoneal, interstitial, submucous, and pedunculated-submucous (fibroid polypus).

By a pedunculated-subperitoneal fibroid is meant a fibroid which is projecting into the abdominal cavity, and is attached to the external surface of the uterus by a stalk.

A subperitoneal fibroid is a fibroid growing on the external surface of the uterus, just under the peritoneum,

so that the latter is pushed up, and the outer surface of the uterus is uneven.

An interstitial fibroid is one growing in the wall of the uterus, and not projecting beyond either its external or internal surface.



FIG. 26—A uterus, the seat of multiple fibroids, cut in half to show the directions in which a fibroid may grow, starting as an interstitial fibroid. 1. Pedunculated-subperitoneal; 2. Subperitoneal; 3. Submucous; 4. Interstitial; 5. Fibroid polypus of body; 6. Fibroid polypus of neck of uterus; 7. Vagina.

A submucous fibroid projects towards the cavity of the uterus pushing the mucous membrane before it, and causing the internal surface to be irregular.

A pedunculated submucous fibroid—or, as it is generally termed, a fibroid polypus—is in reality a later stage

of a submucous fibroid. The tumour now covered with mucous membrane is expelled from the uterine wall into the cavity of the uterus, all except a small portion which forms a stalk.

SYMPTOMS.—

Menorrhagia; metrorrhagia; leucorrhœa; dysmenorrhœa; sterility, and those of pressure.

Menorrhagia, Metrorrhagia.—The amount of hæmorrhage caused by fibroids varies greatly in different women.

The bleeding is due to the rupture of blood-vessels in the mucous membrane lining the cavity of the uterus, which is enlarged in all cases of bleeding fibroids, in some instances by several inches. The vessels are also likely to rupture because they are diseased.

The loss in some women is only a slight increase at the periods, in others the menorrhagia and metrorrhagia are so marked that the term “flooding” is very commonly given to the great hæmorrhage, which may be directly the cause of death. It is only very rarely, however, that a woman dies from hæmorrhage due to these tumours, and then only, as a rule, because the loss has been spread over a long period, and the patient has been allowed to become exsanguinated by inefficient treatment.

On the other hand, hæmorrhage may be responsible for a large amount of suffering, and, in former times especially, patients were allowed to spend many years as invalids, each month of their life being divided into two cycles, one in which they were bleeding and the other in which their medical attendant was endeavouring by drugs and rest to patch them up for their next bleeding, and so things went on in a vicious circle until death, the menopause, or some enterprising gynæcologist, relieved them of their misery.

The different kinds of fibroids vary in the amount of bleeding they are likely to cause, thus, the pedunculated-subperitoneal and subperitoneal varieties do not give rise to any bleeding. A fibroid polypus, as a rule, causes more

hæmorrhage than any other variety. The interstitial and submucous fibroids often cause serious bleeding.

If a fibroid becomes septic, cystic, or malignant, or undergoes red degeneration, the amount of blood lost will be increased.

Leucorrhœa.—This may be due to several causes. As the amount of mucous membrane lining the cavity of the uterus is greater, the number of glands in the membrane is considerably increased, with the result, therefore, that there is much more secretion. Then the leucorrhœa may be due to congestion, or it may be due to a sloughing fibroid polypus, when the discharge will be horribly offensive, and the condition may be mistaken for one of cancer. The leucorrhœa may also be due to the mucous membrane of the uterus being inflamed (endometritis).

Dysmenorrhœa.—The pain at the periods associated with fibroids may be due, very rarely, to the fibroid obstructing the escape of blood from the uterus (colicky dysmenorrhœa), but most commonly it is due to congestion (congestive dysmenorrhœa). As a rule fibroids first make their appearance between the ages of thirty to forty, and so it is at this time that the patient may first complain of the dysmenorrhœa.

Sterility.—Fibroids large enough to be detected on examination, and which give rise to symptoms, are a hindrance to impregnation, but the combination of fibroids and pregnancy is not an uncommon one. Moreover fibroids first appear, as a rule, after the most fruitful time for childbearing. Fibroids develop in married women more frequently than in those unmarried.

Pressure Symptoms.—

Pressure on the Bladder and Urethra.—Pressure on the bladder will cause frequency of micturition, and on the neck of the bladder and urethra retention. A very significant symptom of the presence of a fibroid in the uterus is retention of urine for a few hours or a day before the period ensues. A history such as this makes it practically certain that a

fibroid is filling the pelvis all but a very little, and will soon be exerting very injurious pressure on the surrounding structures. The extra amount of blood that flows to the uterus and tumour, a few days before the period is due, causes the tumour to swell sufficiently to occlude the urethra and so retention results.

Pressure on the Ureters.—A fibroid that is lodged tightly in the pelvis—impacted, as it is termed—will press on the ureters, as may also a very large fibroid reaching up into the abdomen. The kidney will then become diseased by the backward pressure of the urine which has difficulty in getting into the bladder, and the patient may eventually die of uræmia if the tumour is not removed.

Pressure on the Bowel.—The large intestine may be nipped against the brim of the pelvis by a heavy tumour. The small intestine may become twisted round the stalk of a pedunculated-subperitoneal tumour, and the rectum may be obstructed by an impacted fibroid. In the latter case constipation results, and, in all three, intestinal obstruction or perforation of the intestine with fatal peritonitis may occur.

Pressure on the Veins.—As a result the patient may suffer from hæmorrhoids, œdema of the legs, varicose veins of the leg, or thrombosis in the femoral veins.

Pressure on the Nerves.—This may give rise to neuralgia, bearing-down pain, backache, or sciatica.

Pressure on the Diaphragm and Stomach.—With very large tumours—and tumours over 100 pounds in weight are recorded—the action of the diaphragm is impeded so that the heart and lungs cannot properly perform their functions. Indigestion may result.

Secondary Changes in Fibroids.—

A fibroid tumour may become septic, cystic, malignant, undergo red degeneration or it may atrophy.

Septic Fibroid.—A septic fibroid is a very dangerous tumour. The patient is likely to die of peritonitis if the sepsis spreads to the peritoneal cavity, or she may die of septicæmia. A fibroid may become infected from disease of the bowel, of the appendix, or of the Fallopian tubes. It

may become septic from pressure during labour, or it may be infected in a case of puerperal fever after labour. Lastly, a fibroid polypus becomes septic by microbes infecting it from the vagina.

Submucous fibroids and fibroid polypi at times becoming septic, suppurate and are then discharged, so that a cure results, but the patient may become so dangerously ill during the process that she will die before the tumour can be expelled.

SYMPTOMS.—

The patient will have a high temperature, a rapid pulse-rate, perhaps a very foetid discharge; the amount of bleeding will increase, the fibroid will be tender, and there will be marked abdominal pain.

Cystic Fibroid.—In this complication the solid tumour becomes converted into a cyst, and has thus often been mistaken for pregnancy or an ovarian tumour.

SYMPTOMS.—

The size of the tumour increases rapidly, and it becomes softer. There is severe pain, and the amount of blood lost is increased.

Malignant Fibroid.—A fibroid may become involved through the spreading of a cancer of the uterus. Very rarely a fibroid may become sarcomatous.

SYMPTOMS.—

Such a complication would be indicated by very rapid growth, marked bleeding, severe pain and emaciation.

Red Degeneration.—In this the fibroid becomes very red in colour. It is a condition nearly always associated with pregnancy, and may cause trouble then or after labour.

SYMPTOMS.—

The patient complains of pain, tenderness, and of the symptoms of fever which is present.

Atrophy.—A fibroid never appears after the menopause, and at this time if one is present in the uterus it will

atrophy. Such atrophy, except the tumour be smaller than an orange, never goes on to complete disappearance. It is for this reason that a woman nearing the menopause should never be advised to keep her tumour, if it is causing trouble, on the assumption that it will soon disappear. On the contrary a fibroid is often the cause of trouble at the time of the menopause since it may prolong menstrual life, may become polypoid and septic as the result of the shrinking uterus forcing it into its cavity and cutting off its blood supply. Lastly, the atrophy may be the direct cause of serious trouble, or even death, in the case of a fibroid which was resting above the brim of the pelvis, but which on its reduction in size sinks down and becomes impacted in the pelvis.

METHODS BY WHICH FIBROIDS ENDANGER LIFE.

By hæmorrhage, by sepsis, by pressure, by becoming malignant, by twisting of the pedicle, and by complicating pregnancy, labour, or the puerperium.

The dangers of some of these complications have already been discussed.

Twisting of the Pedicle.—The stalk of a pedunculated-subperitoneal fibroid may become twisted in the same manner as that of an ovarian cyst. Pain results, and the tumour may become inflamed.

Effect of Fibroids on Pregnancy.—The pressure symptoms of pregnancy may be more marked, vomiting more troublesome, and in some cases the tumour may possibly favour the occurrence of albuminuria. Pregnant women with fibroids may miscarry from uterine contractions or bleeding set up by the tumours, or because the uterus has become retroverted, and in some cases also impacted. Accidental hæmorrhage is at times due to a fibroid.

Effect of Pregnancy on the Fibroid.—The fibroid grows more rapidly, and in some cases the dangerous change known as red degeneration may appear.

Effect of Fibroids on Labour.—A fibroid may cause obstruction to labour, and so, if unrelieved, rupture of the uterus, by being situated below the presenting part and

narrowing the passage, or by causing malpresentation of the child. A fibroid may also cause inertia and post-partum hæmorrhage either as a result of this inertia, or because it prevents the proper retraction of the uterus.

Effect of Labour on Fibroids.—The fibroid may be so bruised owing to the passage of the child that it becomes infected. Also the stalk of a pedunculated-subperitoneal fibroid may become twisted.

Effect of Fibroids on the Puerperium.—Fibroids are a cause of subinvolution. They may also give rise to secondary post-partum hæmorrhage, and if they become septic they may cause septicæmia.

Effect of the Puerperium on Fibroids.—A submucous fibroid may, as the uterus shrinks, become converted into a fibroid polypus, and if septic may then become expelled. A fibroid may also undergo red degeneration at this time, and have to be removed. A fibroid may become infected as a result of sepsis due to the introduction of germs during labour.

Although the above is a serious list of complications which may ensue should a woman with a fibroid conceive, yet, as a matter of experience, it is found that in a very large majority of cases no harm results either during pregnancy, labour, or the puerperium, and, therefore, unless some complication does arise, no operative treatment is necessary.

It is far different, however, in the case of an ovarian cyst, complicating pregnancy, labour, and the puerperium. In this case there is a very real danger, so much so that the tumour should be removed as soon as possible.

TREATMENT.—

Fibroids need treatment either because they are causing serious hæmorrhage, because they are endangering life by pressure, because some complication arises in them, or very rarely because of their size.

In the olden days the hæmorrhage was treated with drugs and rest, together with as much nourishing food as the patient could afford. In addition the sufferer was

buoyed up with the assurance that at the menopause all would be well.

The results of such treatment in some cases were disastrous, and the patients died of bleeding and exhaustion before the advent of the promised relief. In other cases the results were almost as bad, the patient having to lead the life of an invalid all the best years of her life, every month spending a fortnight or more in bed or resting on a couch. The only exception to this method of treatment was in the case of bleeding due to a fibroid polypus, which was removed.

Nowadays it is recognized that it is not fair or right to allow a woman to remain a chronic invalid from a continual loss month after month and year after year.

Hæmorrhage.—

We may divide cases of hæmorrhage due to fibroids into three classes :—

1. In which the hæmorrhage is so bad that a surgical operation, most frequently hysterectomy, is required to save life. Rare.

2. In which the hæmorrhage is severe, but not so severe as to threaten life. The tumour should be removed by myomectomy or hysterectomy, or removal of the polypus, as the case may be. Fairly common.

3. In which the hæmorrhage is comparatively slight, and can be controlled by drugs. Common.

In those cases in which bleeding due to fibroids starts within a year or two of the menopause, and the patient is averse to operation, so long as the bleeding is not imperilling life, drug treatment may be tried. It must always be remembered, however, that the menopause in such cases is apt to be postponed for some time, and also that *increased bleeding in a woman with fibroids near the menopause may be due to cancer arising in the uterus, or to some change in the fibroid.*

Poor patients, who have to earn their own living, should be strongly advised to submit themselves to operation, since if they have to stay away from work four or five

days in each month their employer will probably dismiss them.

In the majority of cases the proper treatment for hæmorrhage due to fibroids that makes a woman a semi-invalid is to remove the tumour or tumours.

The mortality is so low, and the improvement in health, as a result of the operation, is so striking, that it is now an everyday experience for women suffering from hæmorrhage due to fibroids to consult medical men with a view to operative procedure.

Pressure.—

If a fibroid is endangering life by pressure it should be removed; but a difference of opinion arises when life is not endangered; and the difficulty is to decide whether a fibroid which is not bleeding, but is of a fair size, should be removed. Many surgeons think that such a fibroid should be removed because it is a mistaken policy to wait until pressure symptoms have developed, since then the patient will not be so well able to withstand the operation, which itself will be much more difficult and severe than if the fibroid had been removed at an earlier date.

If, on repeated examination, a fibroid, although not causing hæmorrhage, is found to be steadily increasing in size, then it will be in the best interests of the patient to remove it before pressure symptoms have developed.

Degeneration.—

If a fibroid becomes septic, cystic, or is undergoing red degeneration, it should be removed forthwith. These complications are rare. If a patient is under medical observation their onset will be detected, and the tumour can be removed.

The mortality of hysterectomy or myomectomy for fibroids is, with skilled operators, less than 5 per cent. If the results of all operators were collated, the mortality would be found to be considerably higher. But even supposing that the death-rate from such operations, by operators skilled in this special branch of surgery, was no greater or even a shade less than if these cases were left alone, this would be no good reason for the dictum that all fibroids unassociated with

hæmorrhage should be removed as a precaution against the chance of the tumour becoming the seat of some secondary change, since, if such treatment became recognized and was carried out by doctors not having special experience in this class of work, the operative mortality would at once very seriously increase, and be out of all proportion to the risk incurred by leaving the tumour.

If a fibroid tumour is by its size causing distress, and prevents the patient getting about, it should be removed. In the case of an unmarried woman a fibroid from its size may lead to a suspicion of pregnancy, in which case she would be justified in demanding its removal, even though it was causing no discomfort.

There are three operations for fibroid tumours of the uterus :—

(1) Total hysterectomy, (2) Sub-total hysterectomy, (3) Myomectomy.

Whether total or sub-total hysterectomy is performed will, in most cases, depend upon the predilection of the operator. Some gynæcologists prefer to remove the whole uterus, maintaining that it is then impossible for the patient to have cancer of the cervix. It is true that cancer does rarely occur in the cervix after a sub-total hysterectomy, its incidence, however, is much rarer than cancer of the cervix generally. It is acknowledged that a total hysterectomy is a more serious and dangerous operation than the sub-total variety, and for this reason the advocates for sub-total hysterectomy are in the majority.

Myomectomy, or removing the tumour or tumours and leaving the uterus, is the ideal operation in certain circumstances, when, for instance, the patient is single, when, if married, she is sterile, and wants a child, and in any case when the patient is under forty years of age and the danger of the operation is not increased materially. In experienced hands myomectomy is only slightly more dangerous than hysterectomy, but if practised by all and sundry then the results would show that it was a far more dangerous operation. Its chief drawback is that other fibroid tumours may grow in the uterus, necessitating a hysterectomy later.

Polypi of the Uterus.

The following varieties of polypi may be found in the uterus :—

Fibroid. Mucous. Placental.

Fibroid Polypus.—

This condition has been dealt with under fibroids of the uterus.

Mucous Polypus.—

At times the amount and thickness of the endometrium becomes much increased, and moreover this increase may be more marked at certain spots than others, with the result that a small projection of mucous membrane is formed, which is called a mucous polypus. There may be one or more of these projections, which may grow from the body or the neck of the uterus. In some cases mucous polypi are the result of infection of the endometrium, but in others no evidence of this can be found.

Placental Polypus.—

If a piece of placenta remains in the uterus after the birth of the child and the expulsion of the membranes and the main portion of the placenta, the subsequent events depend greatly upon whether it dies or not.

If it dies, microbes infect it, and septic intoxication results. On the other hand, if it is adherent to the uterine wall, and well nourished by blood-vessels, it need not die. Then as the blood trickles over this piece of placenta fibrin becomes deposited on it, and at last a small polypus is formed.

SYMPTOMS OF POLYPI.—

Menorrhagia ; metrorrhagia ; vaginal discharge, which in some cases is very offensive ; dysmenorrhœa.

In the case of a fibroid polypus the other symptoms of fibroids may be present, and if a placental polypus is present the symptoms will date from labour or abortion.

TREATMENT.—

Removal of the polypus.

Adenomyoma. Endometrioma.

Until the uterus is removed and the tumour is incised an adenomyoma will not be diagnosed. Such a tumour is generally removed on the supposition that it is a fibroid tumour, or a condition known as chronic metritis. The symptoms and signs correspond to those of a fibroid, the most striking of these being an excessive loss at the periods and severe dysmenorrhœa. A more modern name for the tumour is that which indicates that it is mostly composed of glands resembling those present in the endometrium. A very interesting point about endometriomata is that they are found in many other situations beside the uterus; for instance, in any part of the genital canal, in the recto-vaginal septum, ovary, umbilicus and abdominal wall.

Cancer of the Uterus.

Approximately one in every eleven men and one in every eight women, over the age of thirty-five, die of cancer during the year in England and Wales. In 40 per cent. of the deaths from cancer in women the uterus is affected. More women die of cancer than of consumption. In 1911-1920 for every 100 deaths from cancer of the uterus in single women there were as many as 1009 among the married women. As during this period there were 463 deaths of married and widowed for every 100 deaths of single women, the excess of deaths for the married is much larger than normal in the case of cancer of the uterus.

The disease may appear first in the body of the uterus or in the neck. Cancer of the body is fairly rare, most patients suffering from it are between fifty and sixty years of age, and many of them have not had any children.

Cancer of the neck is, in comparison with cancer of the body, very common. It occurs in the majority of women between thirty-five and fifty, and most of the patients have given birth to one or more children. It forms 90 per cent. of the total number of cases of cancer of

the female genital organs and 95 per cent. of the cases of cancer of the uterus.

CAUSE.—

Those authorities who have investigated the subject are of opinion that cancer is not hereditary, but its incidence is



FIG. 27.—Uterus cut in half to show cancer of the neck of the uterus. The cancer is growing from the vaginal portion of the neck of the uterus into the vagina.

so common that it is not surprising that it should affect members of the same family.

The cause of cancer is not known. There is, however, one certain fact about cancer which is that it frequently follows on certain varieties of chronic and prolonged irritation. Thus, as examples, cancer of the lip is associated with the long-continued irritation of smoking a clay pipe; of the

tongue with irritation of a jagged tooth. It may be, therefore, that the laceration of the cervix uteri which is so frequently associated with chronic endocervicitis and erosion, and is so common in women who have borne children, is a predisposing cause, and one reason why cancer of the neck

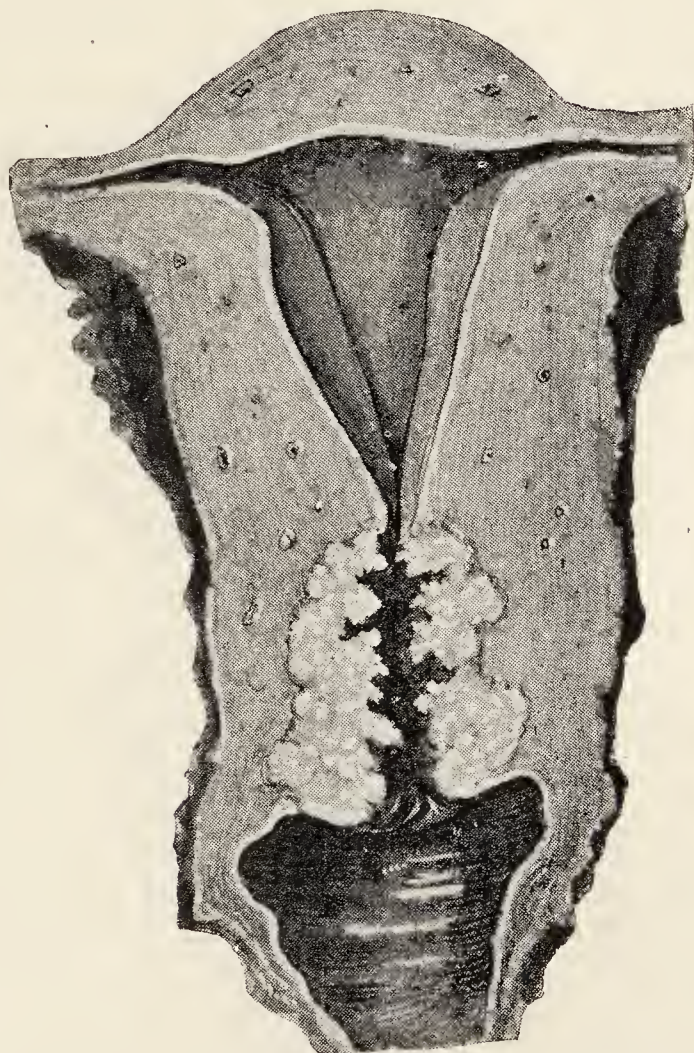


FIG. 28.—Uterus cut in half to show cancer of the neck of the uterus. In this case the cancer is growing from the cervical canal upwards. It does not project into the vagina, so that a doctor on making a vaginal examination would not feel it.

of the uterus is so much more common than cancer of the body of that organ.

SYMPTOMS AND SIGNS.—

Hæmorrhage; leucorrhœa; pain; cachexia.

Hæmorrhage.—This is the earliest symptom both in cancer of the body and cervix.

Such hæmorrhage may declare itself first as an excess at the period or, in the case of cancer of the neck, it may come on between the periods as a result of exertion, of douching, or of coitus. Hæmorrhage after the menopause is most likely to be due to cancer of the body.



FIG. 29.—Uterus cut in half to show cancer of the body of the uterus. The neck of the uterus is not involved.

At times the hæmorrhage is severe, but only seldom is it the immediate cause of death, and then only at a late stage when the ulceration has extended into the uterine artery. The bleeding is usually due to rupture of the small blood-vessels in the tumour.

Leucorrhœa.—This is at first due to congestion, and is not offensive. In the later stages it is due to ulceration

of the growth and septic infection, and the discharge is then horribly offensive. Unfortunately women often apply for advice only when the offensive discharge appears, and then it is frequently too late for any radical treatment to be attempted.

Pain.—This is a variable symptom. In cancer of the cervix it does not appear till late in the disease because this part is not sensitive. The pain is due to the growth spreading to surrounding structures. In cancer of the body, on the other hand, pain is much earlier, as this part of the organ is more sensitive.

Cachexia.—Signifies the yellow earthy appearance, due to absorption of the septic products, which patients, suffering from cancer, have in the last stages of the disease. It is accompanied by the symptoms of wasting, loss of appetite, and exhaustion.

DIRECTION IN WHICH THE CANCER SPREADS.

Downwards.—On to the vagina, implicating the urethra, and so causing painful micturition and eventually retention of urine.

Upwards.—To the peritoneum.

Forwards.—Into the bladder, causing cystitis and a vesico-vaginal fistula.

Backwards.—Into the rectum, causing a recto-vaginal fistula.

Outwards.—Into the broad ligaments fixing the uterus and implicating the ureters.

CAUSES OF DEATH.—

The commonest cause of death is exhaustion. After this uræmia claims the greatest number of victims, and is due to the cancer growing into the ureters and preventing the proper excretion of waste products from the kidney.

The remaining causes of death are hæmorrhage, septicæmia, embolism, peritonitis, intestinal obstruction, and

secondary deposits in the spine, brain, lungs, liver, and other organs. When compared with the first two causes, the remainder are rare.

TREATMENT.—

The treatment is operative, palliative, or by radium and X-rays.

Operative Treatment.—If a patient suffering from cancer of the cervix is seen sufficiently early, removal of the uterus, the cellular tissue in its neighbourhood, the local lymphatic glands, and the upper part of the vagina (Radical Hysterectomy) will certainly lead to the cure of a large number of patients. Unfortunately most of the patients are first seen by the gynæcologist when the disease is so far advanced that a cure is problematical, or such an operation impossible.

Cancer of the body of the uterus can be cured by a total hysterectomy (not of a radical nature) if not seen too late for operative treatment.

There are various reasons why delay in seeking advice occurs. To begin with cancer very commonly appears about the menopause, and the patient thinks, or is told by her friends, and even, unfortunately, in some cases by a nurse or her doctor, that the bleeding she complains of is nothing to be alarmed at, and that it is due simply to the “change of life,” and so precious time is wasted.

Then many patients only bleed a little and they are not alarmed till the offensive discharge appears, when it is often too late for treatment of a radical nature to have a fair chance of cure. Pain, again, in most cases is a very late symptom; while many women shrink from consulting a medical practitioner, dreading a local examination; and, lastly, others have the fixed idea that cancer is incurable, so are not anxious to learn the worst. Patients are generally ignorant of the early symptoms of cancer, but steps have now been taken to educate the public in such matters.

It is now proved beyond doubt that cancer of the uterus is curable if only the patient is treated at an early stage of the disease.

A number of operators all over the world have records of patients who have lived ten, fifteen, and twenty years after an operation performed in the early stages of cancer.

Every nurse, therefore, should know the symptoms of cancer of the uterus, so that when she meets a woman complaining of any of them she can advise her to at once consult a doctor.

Palliative Treatment.—This consists in remedies for the bleeding, discharge, and pain.

For the bleeding the doctor will prescribe ergot, and other drugs, or he may curette the growth. The nurse may be called upon to treat a sudden severe hæmorrhage, in which case she should give hot douches (110° F.), and if this does not stop the bleeding the vagina may have to be plugged.

Leucorrhœa will be treated by various douches, those helping to destroy the odour, such as iodine, sanitas, or permanganate of potash, being most often used. The growth may be curetted.

The discharge may also cause pruritus, which can be treated first by douching and then by smearing the vulva with a mixture of equal parts of castor oil and zinc ointment, or by placing a wool-plug just in the vagina to soak up the discharge.

The best method of diminishing the odour in advanced cases is found to be scrupulous cleanliness (the pads, sheets, nightgowns being changed whenever soiled), douching, and plenty of fresh air in the room. In addition, saucers containing charcoal, and sheets with carbolic lotion sprinkled on them can be placed in the room, but these will seldom be necessary if the other directions are carefully observed.

Pain is a troublesome complaint. It is best treated by

changing the nature of the analgesic directly it commences to lose its effect. Towards the end, injections of morphia will generally be found necessary. As a routine treatment it has been found in the Middlesex Cancer Hospital that aspirin gives the most relief.

What with the pain, bleeding, discharge, emaciation, disorders of micturition, and defæcation, and perhaps bed-sores that attend these pitiable cases in their last stages, only a thoroughly trained nurse is capable of properly looking after them.

Radium Treatment.—Treatment of cancer of the cervix by the application of radium, when properly carried out, has proved to be in the hands of many gynæcologists, and in the case of very large numbers of patients, a successful method. The relative merits of the radical operation and the application of radium cannot be discussed with any advantage here. Taking the results of acknowledged experts the percentage of persons free from recurrence after five years is more or less equal in both methods of treatment, while the immediate mortality for radium is under 1 per cent. whereas that of the radical operation, depending on the skill of the operator varies, taking all operators between 15 and 25 per cent., the average of the leading operators being 17 per cent. It is obvious, therefore, that if this was all, there could be no question as to which is the best treatment.

It is true that the radiologists do not treat such advanced cases as the most expert surgeons, and that, therefore, the latter save a certain number of women who would otherwise perish. On the other hand, the radiologists contend that this is more than counterbalanced by the increased operative mortality following the radical operation. The percentage of recoveries after five years in the case of the radium treatment, however, includes a far greater number of early cases than those of the operators, the operative mortality in early cases being 5 per cent.

One objection taken to radium is that its sphere of action

is very limited and that, therefore, if there are carcinomatous glands present these cannot be destroyed. It is claimed that this drawback has been got over by using X-rays in addition to the radium.

OVARY.

Ovarian tumours are either cystic or solid. The solid tumours, in comparison with the cystic variety, are rare.

CYSTIC OVARIAN TUMOURS.

The different kinds of cystic ovarian tumours may be divided into simple, glandular, dermoid, and papillomatous, the difference depending upon their structure and the nature of the fluid they contain.

Simple Ovarian Cysts.—These tumours do not grow to any large size, the fluid they contain is limpid and clear like water, and is, as a rule, straw-coloured.

If any of this fluid escapes into the peritoneal cavity, no harm results, and many of these tumours are cured if they burst.

Glandular Ovarian Cysts.—These tumours are more complicated in structure. The walls of the cyst are partly composed of glands, and the fluid they secrete (mucus) is thick, tenacious, and greenish in colour, if not altered by inflammation or bleeding, when it may be yellow from the presence of pus, or red, chocolate-coloured, or black from mixture with blood. Should the mucus escape into the peritoneal cavity following rupture of the cyst, it does no immediate harm but, as the glands in the cyst-wall continue to secrete, the mucus gradually distends the abdomen to such an extent that life is endangered from the pressure the fluid exerts.

A certain proportion of glandular ovarian cysts are malignant. The cancer, however, has not always started

in the ovary. It may have started, for instance, in the breast or stomach and affected the ovary secondarily.

Dermoid Ovarian Cysts.—These tumours are very peculiar, inasmuch as they may contain teeth, hair, bones, breast-tissue on which may be situated nipples, nervous-tissue, skin, mucous membrane, sweat and fat glands. Of these, teeth are most commonly present, as a rule only two or three, but over a hundred have been found. The length of the hair varies; generally it is short, but it has been

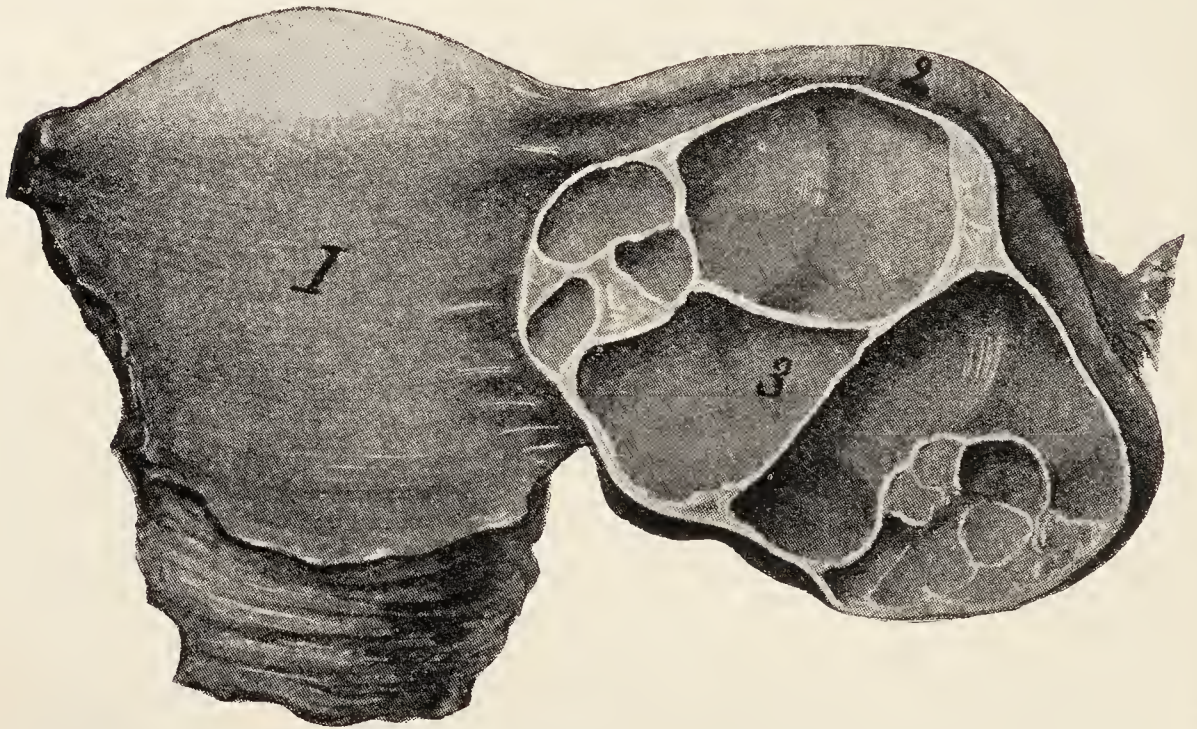


FIG. 30.—Ovarian cyst cut in half to show the compartments in one variety of cyst, the multilocular. 1. Uterus; 2. Fallopian tube; 3. Ovarian cyst.

found several feet long. The colour does not correspond with that of the patient's hair, but it becomes grey with old age.

The fluid is liquid fat, and if it escapes into the peritoneal cavity severe inflammation may be set up (peritonitis), causing the death of the patient.

Papillomatous Ovarian Cysts.—These tumours contain little growths having the appearance of warts, hence their name. If these wart-like structures escape into the peritoneal cavity they become adherent to the viscera, and

continue to grow, and as a result fluid accumulates in the peritoneal cavity.

These warty growths are of two varieties, cancerous and non-cancerous. The former continue to grow till the patient dies. The latter only live a certain time and then disappear; but as their place is taken by others the result, if the tumour is not removed, is the same as if they were cancerous. On the other hand, if the tumour is removed, then in the non-cancerous variety the patient recovers, because the growths that are adherent to the viscera at the time of the operation disappear soon afterwards and there are no fresh ones to take their place.

In the case of the cancerous variety removal of the tumour will not cure the patient if any of the papillomatous growths have once escaped from the cyst and become implanted elsewhere, since, although no fresh ones can become engrafted, yet those already present continue to grow.

SYMPTOMS AND SIGNS.—

Enlargement of the Abdomen.—

Amenorrhœa.—Apart from its being due to depreciation in health, amenorrhœa results only when all the ovarian tissue on both sides is destroyed. After the menopause ovarian tumours may cause a loss of blood from the uterus.

Pressure.—Pressure on the bladder and rectum gives rise to frequency of micturition, constipation, and hæmorrhoids; on the stomach to indigestion; on the diaphragm it impedes the action of the heart and of the lungs, and on the veins it causes œdema of the legs and ascites.

Emaciation.—If the disease is advanced, or if suppuration has taken place in the cyst, the patient becomes emaciated, as also she does if the cyst is malignant.

METHODS BY WHICH OVARIAN TUMOURS ENDANGER LIFE.

By their size.

By the complications of rupture, inflammation, twisting of the pedicle or hæmorrhage.

By their being cancerous.

By their association with pregnancy, labour, or the puerperium.

By pressure on the ureters.

By intestinal obstruction.

Size.—

It is unusual nowadays to meet with ovarian tumours of any large size, the reason being that since aseptic surgery has made it possible to remove these growths with safety, this is generally done as soon as they are detected.

In olden days tumours of enormous size were quite common, and even nowadays, in out-of-the-way places where there are no doctors, among uncivilized nations, or in women who refuse to consult a doctor or listen to his advice, very large tumours may occasionally be found.

One of the largest on record weighed 227 pounds, the fluid it contained measuring 88 quarts.

Rupture.—

CAUSE.—

An ovarian cyst may be ruptured by the wall becoming so thin from pressure of the contained fluid that it tears, or the wall of the cyst may become diseased and give way. Rupture may also be caused by blows or falls, especially against some sharp object such as the edge of a table, during labour, by twisting of the pedicle, by compression of the tumour by the abdominal muscles and contents during laughing, coughing, or stooping to button the boots, and during examination by the doctor.

A case is on record on which a patient with an ovarian cyst was ascending in a lift, the machinery of which broke. The concussion, caused by the lift falling, burst the cyst, and the patient was cured.

SYMPTOMS.—

The symptoms attending the rupture of an ovarian cyst may be divided into immediate and remote.

Immediate Symptoms.—Sudden pain in the abdomen and disappearance of the abdominal swelling; in addition there may be symptoms of internal hæmorrhage.

If the cyst is entirely situated in the pelvis, the second symptom enumerated will be absent, and only if a blood-vessel is severed and remains patent, when the cyst wall is torn, will the last symptom be present.

Remote Symptoms.—These depend on the nature of the fluid contained by the cyst. For instance, in a simple cyst no harm may result; in a glandular cyst the mucus which is secreted will gradually fill the abdominal cavity and kill the patient if it is not removed; in a dermoid cyst the contents are likely to set up peritonitis, which may be fatal. In a warty cyst the growths, becoming scattered, cause a large amount of fluid to collect in the abdominal cavity.

In the olden days when ovariectomy was not performed, patients were tapped when the accumulation of fluid became too great. As an example of the amount of fluid which can be secreted by an ovarian cyst, the following is an account of a specimen preserved in the museum of the Royal College of Surgeons: "The patient was twenty-seven years old when the disease commenced, after a miscarriage of her first child. Between the year 1757 and August, 1783, when she died, she was tapped eighty times, and a total of 6631 pints, or over thirteen hogsheads, were removed from her." Just before her death the fluid accumulated at the rate of $3\frac{1}{2}$ pints a day.

If the patient recovers from the effects of the rupture, then the tumour, in most cases, refills.

Inflammation.—

CAUSE.—

An ovarian cyst may become infected from the intestine, vermiform appendix, or Fallopian tube, if these structures are diseased, in which case they are commonly adherent to the cyst.

A patient with an ovarian cyst and suffering from typhoid fever may have the cyst infected by the typhoid bacillus.

An ovarian cyst may be pressed upon during labour and then inflame. The commonest cause of inflammation of an ovarian cyst is twisting of its pedicle.

If the inflammation is acute the cyst becomes filled with pus, and unless the tumour is removed or the pus bursts into the intestine, bladder, vagina, or through the abdominal wall, she must die. Even if the pus does escape through one of these channels the patient will eventually die unless the tumour is removed.

In less acute cases adhesions are formed so that the cyst is bound down to the structures in its neighbourhood, and its removal becomes a highly dangerous procedure.

SYMPTOMS AND SIGNS.—

The symptoms of inflammation are great abdominal pain, and those of fever. The pulse-rate is rapid, the temperature high with marked intermissions, the abdominal swelling is very tender and tense, and there is emaciation.

Twisting of the Pedicle.—Ovarian cysts are attached to the uterus and broad ligaments by a stalk of tissue made up of several structures, and this stalk is called the pedicle. Under certain conditions this pedicle becomes twisted, with the result that several well-defined symptoms appear.

The torsion may occur slowly or suddenly.

CAUSE.—

Twisting of the pedicle is due to a rotatory movement of the ovarian cyst. This may be brought about by the resistance of swellings in its immediate neighbourhood, such as an enlarged pregnant uterus or a fibroid tumour of the uterus, or another ovarian cyst. Twisting of the pedicle has also been thought by some to be due to the alternate filling and emptying of the bladder and rectum, and its occurrence after labour is probably due to the rapid decrease in size of the uterus.

When the pedicle is twisted, the veins in it are occluded, while the arteries remain patent. Blood which is pumped into the cyst-wall is therefore unable to escape, with the result that the cyst soon becomes very congested.

The next thing to happen is that some of the small vessels in the wall of the cyst burst, and blood is extravasated. In addition, a larger vessel may rupture when blood escapes into the cyst cavity, which may then become so distended that its wall tears.

SYMPTOMS AND SIGNS.—

As a rule the twisting occurs slowly. The patient in this case complains of recurrent abdominal pain, and the tumour is tender. If the twisting is acute there is sudden and great abdominal pain, accompanied by vomiting. The condition is one of “acute abdomen,” and, if the presence of the tumour

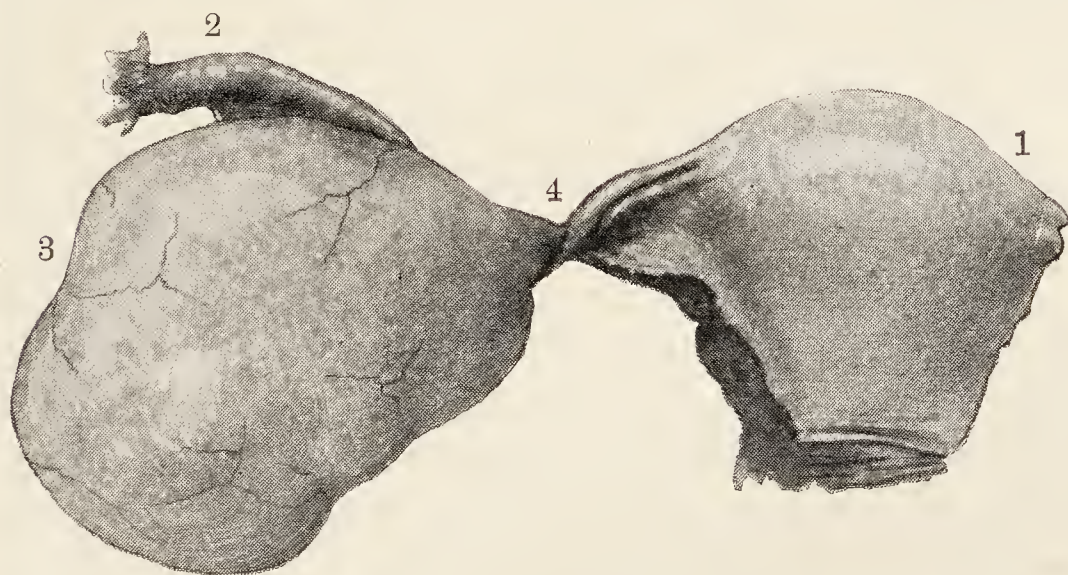


FIG. 31.—An ovarian cyst with a twisted pedicle. 1. Uterus; 2. Fallopian tube; 3. Cyst; 4. Twisted pedicle.

remains undetected, it may be diagnosed as acute intestinal obstruction or appendicitis. In addition, if any large blood-vessels have ruptured there may be the symptoms of internal hæmorrhage.

In a certain percentage of cases there will also be present, in a day or two, symptoms of inflammation of the cyst. The signs are those of rupture, inflammation, or hæmorrhage as the case may be.

Hæmorrhage.

CAUSE.—

Bleeding from the wall of an ovarian cyst may be due to its rupture, to twisting of its pedicle, to suppuration into a blood-vessel, to a warty growth opening a blood-vessel.

SYMPTOMS AND SIGNS.—

The symptoms and signs of bleeding from an ovarian cyst are those of internal hæmorrhage, together with pain, and if the cyst has ruptured then, in addition, the symptoms of that complication.

On occasions a small ovarian cyst is found to be full of thick chocolate-coloured fluid. Such a cyst is an endometrioma, the fluid consisting of blood and mucus secreted by endometrium which, by some means or other, has gained entrance to the ovary.

Cancer.—**SYMPTOMS AND SIGNS.**

Whether an ovarian cyst is malignant or not can only be determined for certain by a microscopical examination of the tumour after its removal. The fact that the tumour has grown rapidly, that it is bilateral, that the patient has emaciated, that there is marked ascites and unilateral œdema of the legs and vulva should awaken suspicion. Bleeding from the uterus after the menopause, in association with an ovarian cyst, suggests that the latter may be malignant. Cancer of the ovary is frequently secondary to cancer elsewhere.

Pressure on the Ureter.—

In very large cysts or in a cyst tightly impacted in the pelvis the ureters may become dangerously pressed upon.

As a result albuminuria is likely to arise, and later, if the tumour is not removed, the kidneys become irretrievably damaged, and the patient dies from uræmia.

Obstruction of the Bowels.—

The bowels may be obstructed by becoming adherent to the tumour or by a portion of them becoming caught in the pedicle when it twists.

Associated with Pregnancy.—

The pressure symptoms of pregnancy become more marked. Vomiting is likely to be more troublesome.

There is a predisposition to albuminuria and eclampsia. The cyst may cause retroversion of the uterus, which may then become incarcerated and miscarriage may occur, or miscarriage may occur apart from the displacement.

The cyst grows more rapidly. It may rupture, its pedicle may become twisted, it may inflame, or it may become jammed down below the uterus and impacted, so interfering with micturition and defæcation.

Associated with Labour.—

The cyst may cause obstruction, either by being in the pelvis and so preventing the head from descending, or by being in the abdomen and so causing some malpresentation of the child. As a result of this obstruction the uterus may rupture.

The contracting uterus may cause twisting of the pedicle, it may rupture the cyst, or it may injure the cyst so that later it inflames.

Associated with the Puerperium.—

As a result of the twisting of the pedicle or bruising during labour the cyst may become inflamed. The patient then becomes septic, and if the tumour is not discovered the condition is put down to puerperal fever, and the patient dies. There have been many cases of such a mistaken diagnosis, discovered on post-mortem examination.

The pedicle of the cyst may become twisted, or in cases of septicæmia the cyst may become infected and suppurate.

TREATMENT.—

Every ovarian tumour should be removed as soon after its discovery as possible, for the following reasons :—

With the rare exception of its bursting and becoming cured, the cyst will certainly kill the patient in the end. It is liable to serious complications. The longer it is left the more dangerous may be its removal. It may be cancerous, when the only chance the woman has is in its removal before the cancer has spread to other structures.

This rule admits of but very few exceptions which, in the absence of some complication in the tumour, are:—

1. If the patient is so desperately ill that an anæsthetic or operation would kill her, the tumour must be tapped.

2. If the tumour complicates pregnancy and the mother is a primigravida within a few years of her menopause. As miscarriage occurs in 19·5 per cent. of the cases operated upon, in such a case as that mentioned it would be wiser to wait, if possible, till the pregnancy was at its 34th or 36th week, when the child will have a good chance of surviving, since the patient, because of her age, may not again become pregnant.

3. When complicating pregnancy there are two ovarian tumours, the removal of which would render the woman sterile.

SOLID OVARIAN TUMOURS.

Solid ovarian tumours are very rare compared with the cystic varieties. Like the latter they may be malignant and non-malignant. The commonest non-malignant variety is a fibroid tumour similar to that found in the uterus.

SYMPTOMS.—

Solid ovarian tumours do not give rise to much trouble in their early stages. They are generally discovered accidentally, except in the case of the malignant forms which after some time, owing to their invasion of adjacent structures, and effect on the general health of the patient, cause her to seek advice.

TREATMENT.—

Solid ovarian tumours should be removed at the earliest opportunity since there are no certain means of telling whether the tumour is malignant or not.

INJURIES.

The perineum, labia, vagina, and uterus may be torn during labour, normal or otherwise. The vulva and vagina

may be injured by an accident, or as the result of violence or rape. The bladder and rectum may be injured during instrumental delivery, and also during the birth of the child unassisted; the result being known as a vesico-vaginal fistula and a recto-vaginal fistula respectively.

The Fallopian tube may be torn as a result of pregnancy occurring therein.

MALFORMATIONS.

The internal genital organs are developed partly from certain cells found in the embryo each side of its spine, and partly from two tubes named the Mullerian and Wolffian ducts, which extend from the region of its kidney to its pelvis.

The cells become either ovaries or testes according to the sex. The upper parts of the Mullerian ducts form the Fallopian tubes and then uniting form the uterus. The Wolffian ducts unite to form the vagina.

The external genital organs are formed by certain folds and dimples in the skin.

Malformations of the genital organs are of two kinds, either the sexes may be combined, or the organs peculiar to one sex or the other may not become properly developed.

Combination of the Sexes.—Owing to some error in development, either in the cells or in the tubes, or in the foldings of the skin, an individual may have the internal genital organs of a woman and the external genital organs of a man or *vice versa*. Such individuals are often called hermaphrodites, but true hermaphrodites must have a complete set of male and female genital organs. In the human race, however, no case has been reported in which in addition to all the other genital organs there were present ovaries and testes. In all cases reported there have only been one set of these organs present, either ovaries or testes, and the proper term for such an individual is a pseudo-hermaphrodite.

Genital Organs not Properly Developed.—It is only necessary here to discuss the result in females. If the

Mullerian and Wolffian ducts remain separate, then the woman has a double uterus and vagina.

If the ducts join first at the level of the vagina then she has a double uterus.

The internal and external genital organs become connected by the Wolffian ducts growing downwards towards the dimpling in the skin which forms the vulva. A membrane is formed where these two meet, just at the vulval orifice and is called the hymen. By the perforation of this membrane the vulva leads into the vagina. If this perforation does not take place the condition known as imperforate hymen results, which leads to the menses being retained from the onset of puberty (see page 90).

Lastly, if the cells or ducts develop true to sex but not completely, the ovaries, Fallopian tubes, uterus or vagina may be very small and unable to perform their functions.

PART VI.

GYNÆCOLOGICAL NURSING.

THE BEARING OF A NURSE.

A FULLY trained nurse is one who has developed and brought to a fine art the care and management of the sick, having a sympathetic and intelligent grasp of the theory and practice of nursing.

To have reached such a stage, a nurse must have spent at least three years in a recognized training-school where all her faculties should have been exercised to the perfecting of each detail of her work, in no way overlooking the fact that this training is useless unless her character has developed along sound and strong lines, and she has cheerfully responded to the stern discipline which alone can make productive those qualities which are essential to her calling. Taking character as the foundation of a good nurse, an implicit and unquestioning obedience to all instructions received from those in authority is required, together with absolute loyalty, a wise energy, and a forgetfulness of self in the love of the work she has undertaken.

Such a nurse will perform her duties with a freedom from self-consciousness and a quiet reserve which cannot fail to elicit the respect of those with whom and for whom she works, and in so doing will uphold the status of the profession she represents.

Manners are often overlooked in a nurse's training, due probably to the rush of her work, and she may be in danger of losing the confidence of her patient through an

appearance of hurry which must therefore be wholly foreign to her nature.

Towards patients and strangers alike she should be at all times courteous, sympathetic, and helpful, but in every way free from familiarity.

The essential qualities then of a fully-trained nurse are sympathy apart from sentimentality; an intimate knowledge of all the details of her work which will serve to inspire confidence in patients and doctors alike; a cheerful self-forgetfulness, holding sacred any information confided to her by doctor or patient, ever avoiding all conversation of a personal nature; and lastly, accuracy and minute attention to detail. These latter qualities a nurse only acquires in her probationer days, when her habits are being formed and her powers of observation developed by the routine ward-work, rough and heavy though it may have seemed, for only by such work can she become alert, quick, and have gained that observant and practised eye by which all details of a sick-room and all wants of a doctor are grasped without effort.

The natural outcome of such attributes will be punctuality, neatness, quietness, cleanliness even to the minutest detail, method, and order.

All this is but an outline of what might almost be described as a limitless subject, on the bearing of a nurse towards her patients, doctors, fellow-workers, and the public at large.

CHAPTER XVIII.

METHODS OF STERILIZATION.

STERILIZATION can be effected by means of heat or chemicals.

Heat.—

Heat may be used for sterilizing in two ways, either in the form of dry heat or moist heat, the latter being employed in the form of water or of steam.

Baking.—Dry heat at a temperature of 150° C. will kill spore-forming bacteria if exposed to it for an hour. Its application for this object has, however, the disadvantage that it penetrates badly, and so bacteria in the middle of an article may escape destruction. For gynæcological purposes this method is not a useful one, since the oven will only take small articles, and cotton, linen, and flannel goods will be scorched.

Boiling.—For articles that can be used directly after being boiled this is the most convenient method of sterilization. Instruments, silk, thread or silkworm gut ligatures and sutures, and india-rubber gloves are usually so treated, while towels and swabs can be if steam is not available. The sutures and ligatures should be boiled for one hour, the remaining articles for at least 20 minutes.

Steaming.—Steam under pressure is the best method for sterilizing towels, dressings, swabs, operating-gowns, masks, and such-like articles. Bedding and clothing are also most efficiently sterilized by this method. Leather, felt, skins, and macintoshes cannot be steamed.

India-rubber gloves are in many hospitals sterilized by steam. The method is entirely efficient but very extravagant since the rubber perishes very quickly and in many

cases the gloves can only be used once. As a matter of fact the *only* advantage of this method of sterilizing gloves is that they are easier for the surgeon to put on and perhaps rather more comfortable to wear, a high price to pay for such trifling objects.

A useful and efficient method of sterilizing dishes, trays, and such articles that will not be injured thereby, is to pour into or over them a small quantity of methylated spirit. The spirit is then set alight and allowed to burn itself out.

Chemical.—Too much reliance must not be placed upon the action of chemical substances. It has been proved beyond question that in the strength that can be employed in antiseptic surgery, they may not kill, within reasonable time, the more resistant forms of even nonsporing bacteria. The following chemicals, among others, are used for sterilizing purposes :—

Mercury. Carbolic acid. Lysol. Monsol.

Mercury.—This is used in the form of its salts, the perchloride or biniodide. Perchloride and biniodide of mercury are very poisonous and are decomposed by lead, tin, and copper; a solution of these salts is more or less useless in the presence of albumin, forming with it an insoluble compound. Since albumin is contained in blood and other discharges from a wound, these substances must be washed away before the solution of mercury can kill the bacteria. Likewise soap must not be allowed to contaminate the mercurial solution. Perchloride of mercury corrodes metal and is the source of great irritation to the hands of some people.

Mercury is the strongest chemical suitable for the purpose known, but care must be taken in its use, and owing to its poisonous nature its solutions must be prepared with the greatest care.

If a patient is poisoned with any preparation of mercury she will complain of a metallic taste, sore gums, colic, and nausea. She will suffer from salivation and diarrhœa. Her breath may be very offensive, and there may be blood in her motions. In bad cases the pulse is small and its

rate rapid, the patient has an anxious expression, her skin is cold and clammy, and she may have suppression of urine.

For the catheter, douche-nozzle, vulva, and hands a solution of biniodide or perchloride of mercury, 1 in 2000, may be used. For the vagina and uterus a strength of 1 in 4000 is sufficient. Many doctors order a douche of saline to be given after an intra-uterine or vaginal douche of mercury, to avoid the possibility of poisoning.

Carbolic Acid.—Carbolic acid is an uncertain chemical for sterilizing purposes unless it is used at such a strength that it will injure the tissues. It is, however, a good disinfectant. It has the advantage of not injuring the instruments or combining with albumin, so that it can be used in the presence of that substance. The first sign of carbolic acid poisoning is that the urine becomes green or greenish-black.

Carbolic acid is very useful for sterilizing macintoshes, dishes, and porringers, for which purposes its strength should be 1 in 20 (one ounce to a pint of water). For the skin, instruments, and hands 1 in 40 is strong enough.

Lysol. *Monsol*.—Belong to the carbolic acid group of chemicals. They are, however, not so poisonous, and rather more efficacious in their bactericidal properties.

For the skin, hands, and instruments they can be used at a strength of 1 in 160 (a teaspoonful to a pint of water), and for the vagina and uterus 1 in 320.

Because of the poisonous nature of these chemicals the nurse must remember to prepare the solutions for douching in strict accordance with the doctor's orders, and, in addition, when she is giving a vaginal douche, she must be sure that none of it is retained, and to this end after the douche-nozzle is withdrawn she should pull back the perineum and press upon the abdomen.

One of the most important lessons a nurse has to learn is that of surgical cleanliness. A thorough knowledge of the conditions of asepsis and antisepsis will certainly help

her a good deal in this, but she must be able to carry into practice what she has learnt. One has often seen a nurse, whose knowledge of the principles of surgical cleanliness has been quite sufficient, fail in this respect through lack of care and strict routine. Thus a nurse will sterilize all the instruments and appliances, will dress herself in appropriate apparel, will scrub her hands and soak them in an antiseptic afterwards, but will then proceed to touch some object which has not been sterilized, be it the patient, a piece of furniture, or even her cap! after which she may, unless admonished, continue to help at the operation without again rendering her hands as aseptic as possible.

A nurse must remember when assisting with the instruments or swabs at the operation, that after having once rendered her hands and forearms as aseptic as possible she must not touch anything that has not been sterilized till the operation is finished. Very rarely with insufficient assistance this may be impossible, in which case the nurse must again prepare her hands, or if, as she should be, she is wearing india-rubber gloves, she must put on another pair or wash them thoroughly in mercury solution.

How to Disinfect a Room.

The nurse may be called upon to disinfect the room after it has been occupied by some septic case. The disinfection should be carried out as follows with the additional help that is necessary:—

All the linen that can be boiled should be placed in a solution of carbolic acid 1 in 20, or lysol 1 in 160, and then removed from the room.

The windows and fireplace should now be pasted up with brown paper so as to prevent any air from entering the room. Next, the blankets, mattress, and bolsters should be spread out, and all the drawers and cupboards should be opened so that their contents are exposed as much as possible.

A formalin lamp (which can be hired at a moderate charge from most chemists) should now be placed in the

centre of the room, and after the lamp is lit the room should be left as quickly as possible, the door closed, and the key-hole and the junction of the door with its frame pasted over with strips of brown paper.

At the end of twelve hours the door, windows, and fireplace should be opened and the room exposed to the fresh air for some time.

Everything as far as possible should be sent to the wash.

The room and its contents must then be thoroughly scrubbed with soap and water. If the walls are papered it is better that they should be stripped and afterwards washed with some disinfectant. If distempered or painted the walls should be sprayed with formalin and then washed down.

Books and papers should be burnt as they cannot be disinfected unless exposed to a degree of heat which would spoil them.

If a formalin lamp cannot be obtained, the room can be less efficiently disinfected with rock sulphur. Three pounds of this should be placed on a shovel with some red-hot cinders, the whole being placed over a bath of water, so that if any cinders should fall there would be no danger of fire. Sulphur candles are sold for disinfecting purposes.

CHAPTER XIX.

POSITION OF THE PATIENT FOR EXAMINATION OR OPERATION.

IN gynæcological practice the nurse will be told by the doctor to place the patient in various positions according to the nature of the examination to be made, the treatment to be carried out, or the operation to be performed.

The nurse must make herself conversant with these various positions, and should be able, without any delay or hesitation, to place the patient in the required position. It is very irritating to the doctor to discover, either that the nurse does not know what he means or, if she does, that she is not capable of carrying out his directions. Nevertheless it is not at all uncommon when operating in the house of a patient, and even in a Nursing Home, to find the nurse ignorant of such things, and an interrogation will elicit the fact that such ignorance is more often due to the nurse not having been trained in this respect (when she was in hospital) than to forgetfulness.

For Examination and Treatment.

Recumbent Position.—Doctors examine their patients, when consulted for symptoms of an obstetrical or of a gynæcological nature, by a routine method. First an examination of the breasts and abdomen is made, then an examination of the vulva, and lastly, if necessary, an examination of the vagina, uterus, ovaries, and Fallopian tubes.

The recumbent position is therefore the first to be assumed by the patient in whom such an examination is necessary.

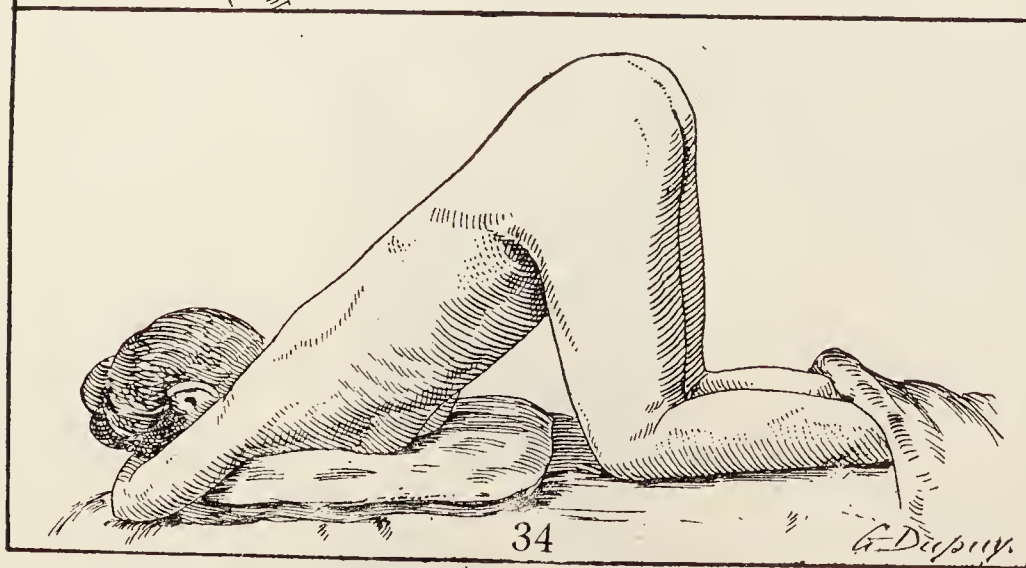
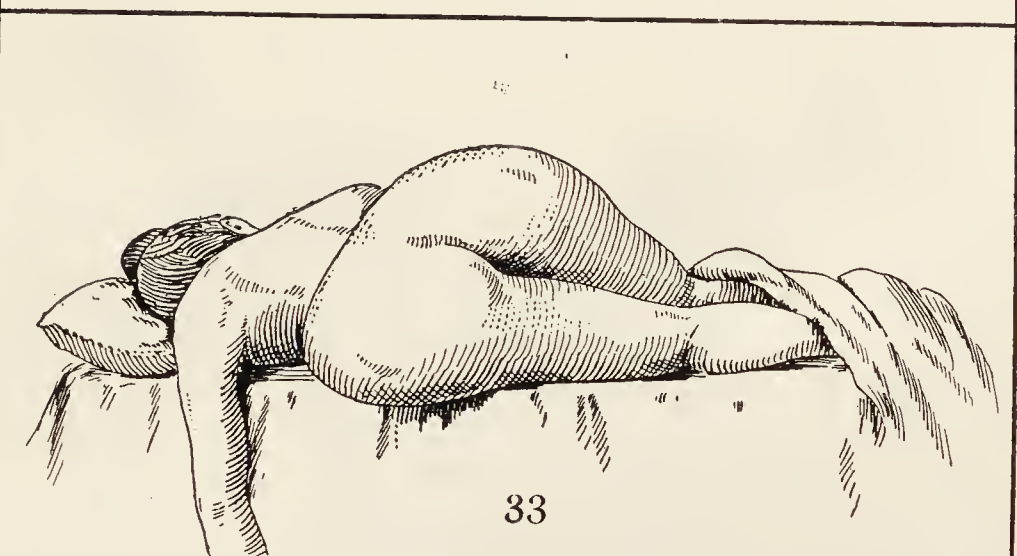
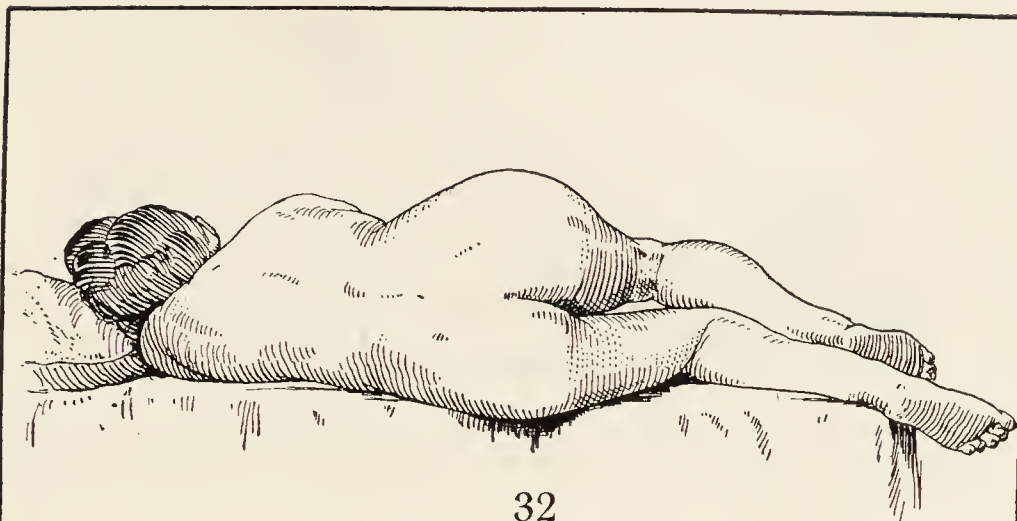


FIG. 32.—Left Lateral Position. FIG. 33.—Sims's Semi-prone Position. FIG. 34.—Knee-pectoral Position.

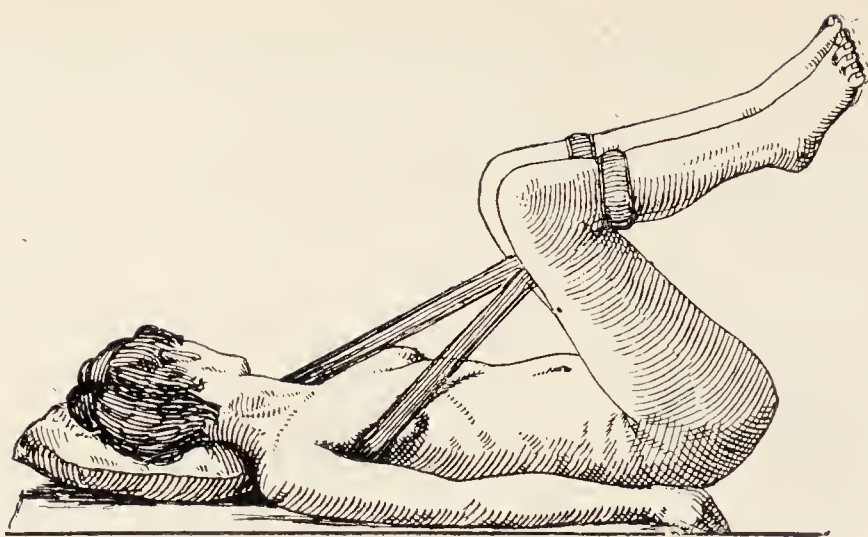


FIG. 35.—Lithotomy Position. Note that the cross-bar of Clover's crutch is applied below the knees, and the strap is over one shoulder and below the other.

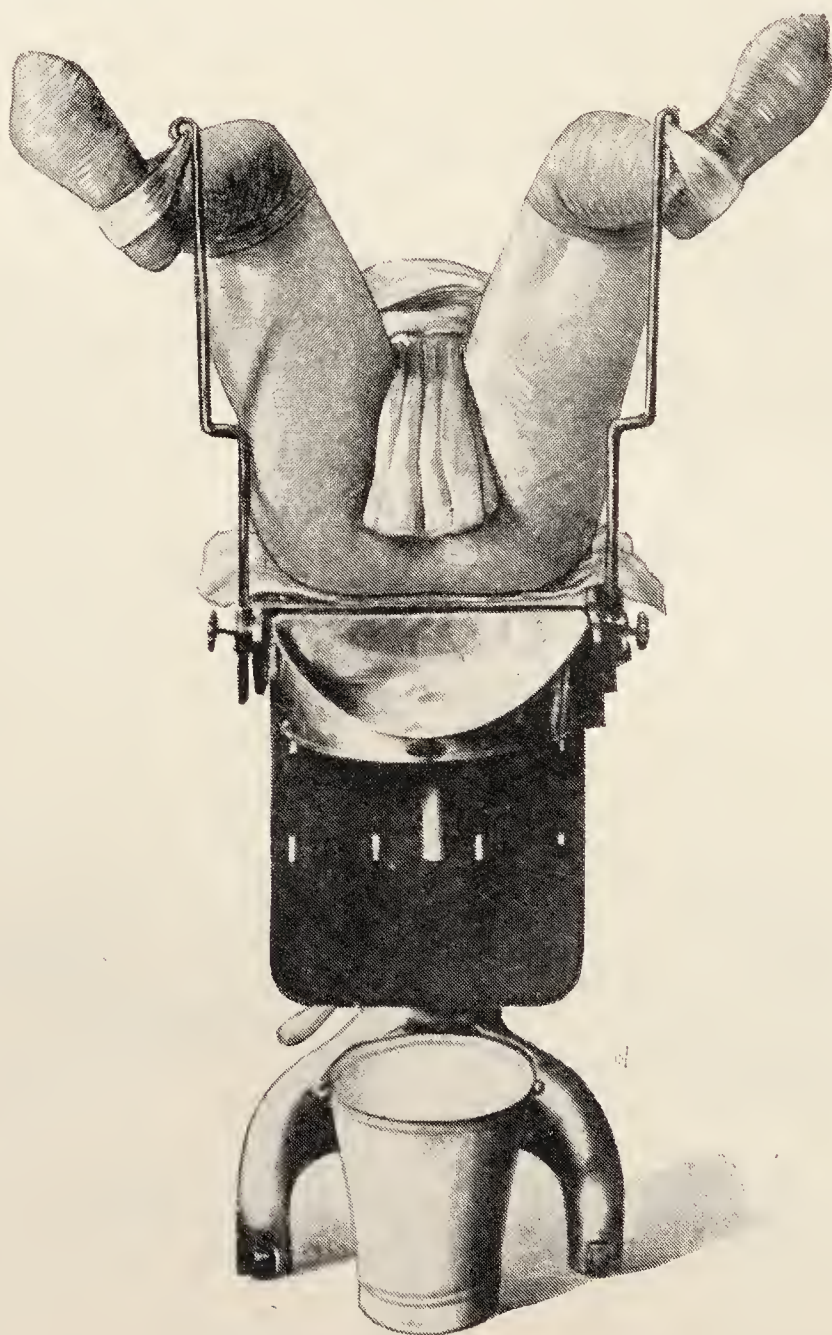


FIG. 36.—Lithotomy Position.
(Allen & Hanbury's St. Bartholomew's operating table.)

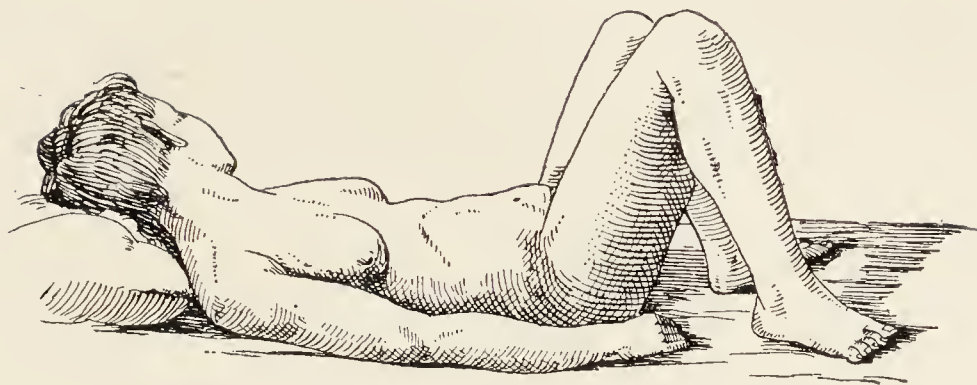


FIG. 37.—Dorsal Position.

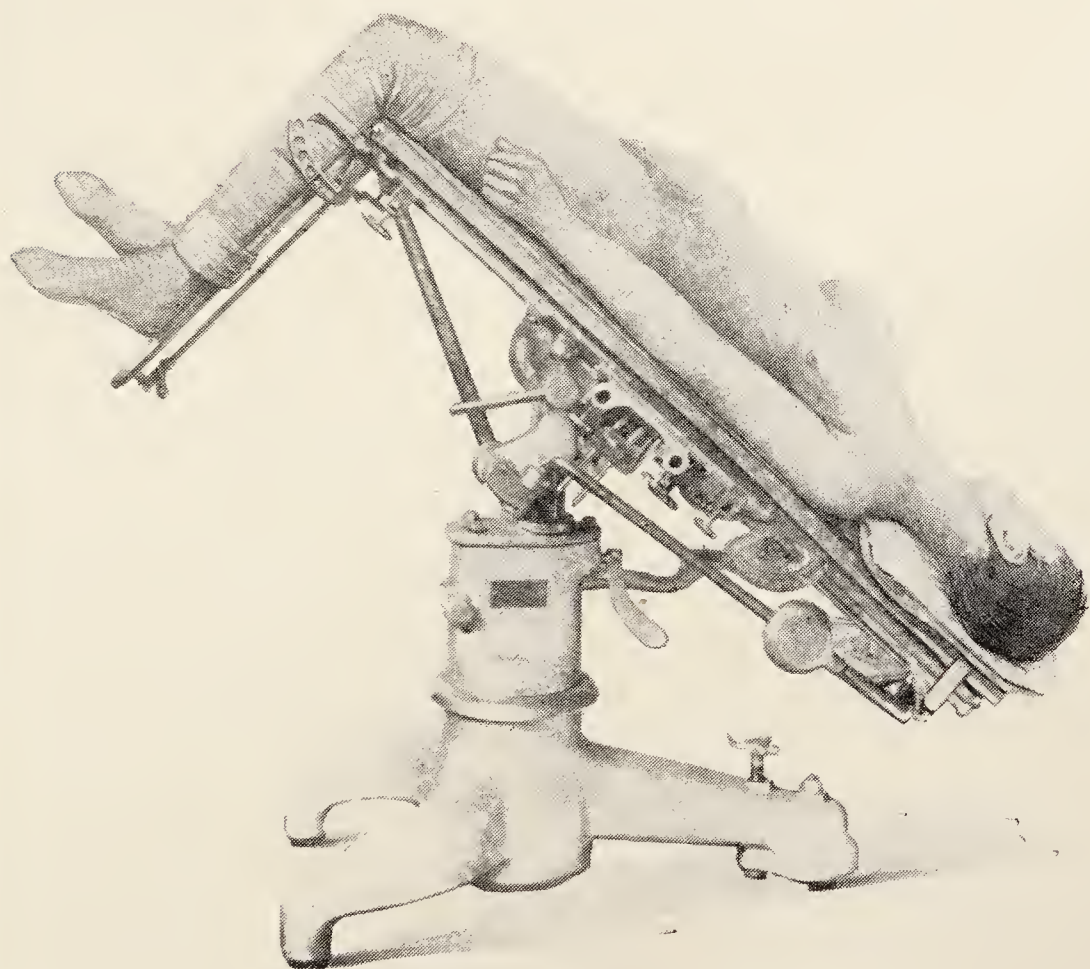


FIG. 38.—Trendelenburg Position.

(Allen & Hanbury's St. Bartholomew's operating table.)

In this position the patient lies on her back with her head and shoulders supported by a pillow. If in bed her night-gown should be drawn up so far as the breasts, and the lower part of her body should be covered with the sheet only, which should be drawn down so that it just hides the pubic hairs.

So many nurses, when asked to get ready a patient for examination in the recumbent position, forget to turn down far enough the blankets and bed-cover or quilt.

If the patient is not in bed she should remove her corsets and also her skirt, after which the strings of her petticoats, and drawers if she wears them, should be loosened so that they can be pushed down till the abdomen is bared, or if combinations or knickers are worn these should be unbuttoned or removed.

Left Lateral Position.—In the left lateral position the patient lies on her left side, her head on a pillow with her knees drawn well up towards her chin, and her back somewhat arched. Her buttocks should be lifted over the edge of the bed and the sheet or petticoat should be arranged so that it can be drawn up easily so as to expose the vulva (Fig. 32). As a matter of experience very few nurses lift the buttocks of the patient over the edge of the bed, when placing her in the left lateral position.

The patient is placed on the left side because most doctors are right-handed.

In this position the vulva can be well inspected, a bimanual examination can be made, pessaries can be inserted, and minor treatment to the vagina or cervix carried out.

Semi-prone Position.—The semi-prone position was invented by an American gynaecologist named Marion Sims, and is therefore often called after his name. On the patient assuming such a position, if the doctor separates the labia the air enters the vagina and distends the vaginal walls, and by this means, and with the aid of the duck-bill (Sims's) speculum the vaginal walls and cervix can be efficiently examined (Fig. 33). It is also a good position for replacing an incarcerated retroverted gravid uterus.

The patient lies well over on her left side with her face and breasts on the pillow, her left arm hanging behind her over the edge of the bed or couch; while her pelvis and thighs are kept in the left lateral position, the right thigh being flexed somewhat more than the left.

Knee-pectoral Position.—This position causes the air, when the labia are separated, to enter the vagina and distend it to its greatest limits, in fact there results a pressure of fifteen pounds to the square inch (that of the atmosphere) in the vagina. Advantage is taken of this pressure and also of the fact that the viscera tend, in this position, to fall away from the pelvis, when endeavouring to replace an incarcerated retroverted gravid uterus or a tumour impacted in the pelvis, but as these conditions are of infrequent occurrence the nurse will not often be asked to place the patient in this position.

The patient is placed so that she kneels on the bed or couch, her thighs being in a vertical position and her feet projecting over the edge of the couch. At the same time her breasts rest on a pillow, and her face is turned to one side (Fig. 34).

Dorsal Position.—In this position the patient lies in the recumbent position with her knees well drawn up and separated. Some doctors prefer to make a bimanual examination with the patient in this position. The doctor stands either at the right side of the patient, or if the patient is placed across the bed or brought to the end of the couch with the buttocks overhanging, then he stands between her legs.

In this latter case the legs must be held or may be placed on two chairs, or on extension brackets if the couch is fitted with these. The patient's head and shoulders should rest on a pillow, her nightgown or petticoats must be drawn up under her buttocks and her knees should be covered with a sheet or shawl (Fig. 37). The advantage of this position is that an examination can be made with the pelvic organs more or less in their natural position, and if the doctor stands in the second position indicated, a very complete

examination can be made of the vulva, while treatment to the vagina or cervix can be easily applied. This is also the best position for passing the catheter, in which case the sheet should be drawn up above the pubes.

One of the most useful positions of all for the bimanual examination, and one which does not expose the patient to such an extent as that last described, is for the patient to lie with the upper half of her body in the recumbent position and with her pelvis and thighs in the left lateral position, or as near to this as she is able.

For Minor and Major Operations.

Recumbent Position.—In this position the patient lies flat on the operating table; it is used when the Trendelenburg position is not required.

Lithotomy Position.—In this position the patient is placed in the dorsal position, and her buttocks are drawn well over the end of the table. The thighs are then flexed on the trunk and the legs on the thighs. If the patient is kept in this position by means of a Clover's crutch, the nurse must remember that *the cross-bar is strapped to the legs below the knee, and not to the thighs above the knee and that the strap goes over one shoulder and under the other*. It does not matter how experienced a nurse may be, she may have even been a Theatre Sister but, in most cases, when she takes up private nursing she will invariably apply this cross-bar incorrectly. If an operating table is being used it will have uprights at its end to which the *ankles should be strapped and not the knees*, which will obviate the necessity of using a Clover's crutch (Fig. 35). A common mistake for the nurse to make is not to draw the buttocks of the patient far enough over the edge of the table.

Trendelenburg Position.—The Trendelenburg position, named after the surgeon who suggested it, is the position in which the patient is most often placed for an abdominal operation on the pelvic organs. The patient is so tilted that her knees are the highest point and her head is the

lowest. This position to be perfect requires an operating table that is made to tilt especially for this purpose. *While the patient is being tilted into this position, a nurse must press the feet back so that the legs are at right angles to the thighs*, otherwise the patient will slip down, perhaps into the lap of the anæsthetist. This apparently small point is of more importance than most nurses working in private, or in Nursing Homes, appear to think, for the patient having slipped down, the table has to be lowered and the whole process repeated; a waste of time, energy, and most irritating to the surgeon. When the requisite tilt has been obtained, the ankles are secured to the frame of the table with bandages. The best tables have movable end-pieces to which the ankles can be secured before the table is tilted so that the legs need not be held at right angles. If such a table is not available a modified Trendelenburg may be obtained by resting the back of the patient against a chair turned upside down, allowing her legs to hang over the rail below the seat. The great advantage of the Trendelenburg position is that the intestines and omentum fall back towards the diaphragm, leaving the pelvis free and exposing the pelvic organs (Fig. 38).

After Operation.

Minor Operations.—The exact position of the patient in bed after a minor operation does not in most cases signify, though after perineorrhaphy the patient will be more comfortable on her side owing to the swelling and tenderness at the site of the operation, unless a ring air cushion is available.

Major Operations.—When the patient is first returned to bed she should be placed upon her back, her legs should be raised and her knees kept flexed by means of a pillow placed under them. In this way strain on the abdominal muscles is prevented. A pillow should also be placed under the small of the back which needs support.

After the shock of the operation has subsided the patient,

if she wishes, may be turned on her side and kept in that position by pillows placed under her shoulder and legs.

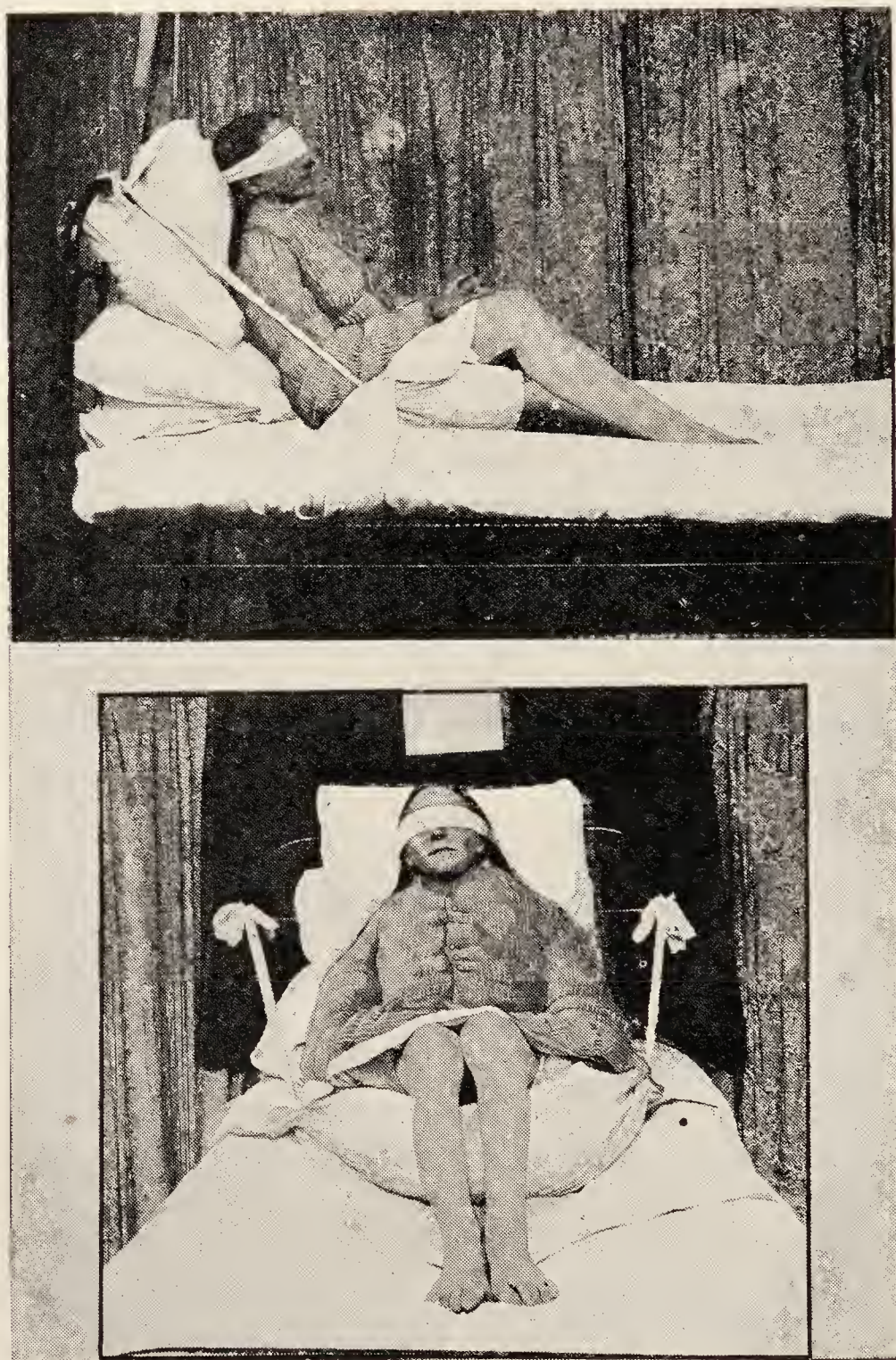


FIG. 39.—Fowler's Position.

Fowler's Position.—In this position the patient is propped up in a sitting posture by means of a bed-rest or

pillows. To keep her from slipping down into the bed a bolster rolled in a draw-sheet with long ends is placed under her knees. To keep this bolster in position, bandages are tied to the long ends of the draw-sheet and to the head of the bed on each side. If the patient is heavy and the bolster tends to buckle up, a broom-stick wrapped round with a blanket and draw-sheet will be found a most efficient substitute (Fig. 39).

Fowler's position is the very best for the patient to assume after an abdominal operation. It relieves the backache, diminishes the tendency to flatulence and sickness, and encourages sleep and drainage from the vagina.

After Spinal Anæsthesia.—The patient is returned to the ward on the ambulance in a modified Trendelenburg position by means of a wooden apparatus. After the patient has been returned to her bed, the front legs of the bed are rested on the seats of two chairs for four hours. For the next four hours the front legs are rested on blocks 12 inches high, for the next four hours on blocks 6 inches high after which the bed is placed in its usual position and two pillows are put under the head of the patient. By precautions such as these it is found that the very severe headache, which may last for days after spinal injection, is practically abolished.

If abdominal drainage has been employed this position also allows the fluid to escape more easily through the tubes.

If the patient is very anæmic she must be kept quiet and must not be allowed to exert herself in any way.

CHAPTER XX.

VAGINAL DOUCHING AND TAMPONADING—CATHETERIZATION—WASHING OUT THE BLADDER—SALINE INFUSIONS.

VAGINAL DOUCHING.

VAGINAL douching, unless employed in suitable cases, does more harm than good. The normal secretion of the vagina is acid in reaction and it has a deleterious effect on most septic and pathogenic organisms.

Nature never intended the vagina to be douched, and to wash away its secretion only encourages the growth of microbes, more especially if the solution used is an alkaline one. Moreover, as vaginal douching causes a certain amount of congestion, it really, if persisted in for any length of time, increases the secretion of the genital organs, tends to make the period more profuse and is, in some cases, the cause of dysmenorrhœa and pelvic pain. It is a matter of everyday observation that as long as a woman continues to use a vaginal douche, her leucorrhœa persists.

Vaginal douching is most commonly used by women for leucorrhœa, and this without the advice of a doctor. When it is remembered that in most cases of leucorrhœa, the discharge comes from the lining membrane of the uterus, and that the solution used in a vaginal douche cannot possibly get into the uterus, unless the cervix is dilated, it is manifest that the only result of vaginal douching, apart from any harm it may do, is in most cases to wash away the discharge that has collected in the vagina. The amount of leucorrhœa will undoubtedly

appear to the woman to be less, but the other symptoms she often complains of may rather tend to get worse.

It is not the custom of most operators, nowadays, to order vaginal douching after the operations of anterior and posterior colporrhaphy or of perineorrhaphy. The cases are found to do better if treated by the "dry method." It sometimes happens, that in spite of every precaution, a certain amount of infection takes place in the wound accompanied by an offensive vaginal discharge. In these circumstances the surgeon may order antiseptic douches. In this case the nurse should use a piece of rubber tubing for the douche nozzle, a full size rubber catheter will do very well. If the glass or vulcanite douche nozzle is used there is a very real danger of the nurse forcing the end of the nozzle between the sutured edges of the wound, and so seriously interfering with the success of the operation. This accident has often happened.

Vaginal douching may also do harm in other ways. For instance, if a woman has a gonorrhœal infection of her vulva, a vaginal douche may be the means of conveying the gonococcus to the vagina or uterus and so to the Fallopian tubes, ovaries, and peritoneum. Again, after the uterus has been curetted, vaginal douching may lead to its infection, and this is perhaps why the result of this operation is so often disappointing.

Vaginal douching, however, is definitely indicated in certain cases. Thus the septic condition of the vagina and the offensive discharge associated with cancer, sloughing fibroid polypi, or sloughing after operations or childbirth will necessitate antiseptic and deodorant douches.

Uterine and vaginal hæmorrhage is rightly treated with hot vaginal douches, but the douche must be hot and not warm. Pelvic inflammation, such as pelvic peritonitis and pelvic cellulitis, can in many cases with advantage be treated by hot douches. If a patient is wearing a pessary she should give herself a vaginal wash out once a day for cleansing purposes.

The Administration of Vaginal Douches.

The following articles are required: a douche-can, a douche-pan, a bath thermometer, and a measure.

The douche-can should hold 2 quarts, should have 6 feet of tubing attached to it, a glass nozzle, and a tap near the nozzle so that the patient can, if she likes, stop the flow.

As a rule only 2 quarts of fluid are used at a time, which take about five minutes to run through, and the douche-pan should hold this quantity. If, however, for some reason the doctor wishes the patient to be douched longer, say for fifteen or twenty minutes, then, in addition, a pail will be required to empty the contents of the douche-pan into, or a douche-pan may be obtained to which is affixed a piece of rubber tubing, the free end of which on being put into the pail carries the douche from the douche-pan into the pail, without the patient having to be disturbed.

The temperature generally employed for aseptic purposes is 110° F., and that for bleeding or inflammation is 115° F. to 120° F. Most patients can stand a temperature of 106° F. to 110° F., but when the temperature rises above this and the douche runs for any length of time some distress may be caused by the fluid, as it escapes into the douche-pan, burning the inner surfaces of the thighs. This can be greatly modified by smearing the parts involved with vaseline.

In the preparation of these douches the nurse must be most careful *that the antiseptic to be added to the water is of the strength ordered and the temperature of the solution the correct height.* A nurse may sometimes be seen to pour in the antiseptic without having the least idea of what the real strength of the douche will be, while to gauge the temperature she will make a rough guess by inserting her fingers into the fluid.

Nurses should remember that it is quite easy to poison or scald a patient with a vaginal douche, the solution of which has been improperly prepared.

The solution should always, therefore, be mixed in a separate jug, and its temperature tested before it is emptied

into the douche-can. All the appliances for douching should be rendered as aseptic as possible by a thorough washing and boiling. If there is no utensil large enough in which to boil the douche-can, it must be swabbed with carbolic acid (1 in 20), and the glass nozzle should be, between whiles, kept in a solution of carbolic acid (1 in 20).

Douching on the Back.—All pillows should be removed in order that the pelvis may be suitably tilted, and the patient should lie flat on her back, with her legs drawn up and separated, her pelvis resting on the douche-pan which has been warmed. A macintosh is placed under the douche-pan, and the bed-clothes are drawn up. The nurse having placed the douche-can in a convenient place and raised above the level of the patient, then thoroughly washes her hands, cleans the vulva with biniodide of mercury (1 in 2000) lysol or monsol (1 in 160), and again making her hands as aseptic as possible introduces the nozzle by separating the labia with her left fingers and pushing the nozzle into the vagina with her right hand. The tap is then turned and the douche flows into the vagina and out again into the douche-pan.

Douching on the Side.—The patient is placed in the left lateral position with her buttocks drawn over the edge of the bed, the knees well flexed, the right beyond the left, and both raised at an angle from the bed by a pillow which slopes to the lower hip. A thick pad must be placed between the thighs, the upper end against the pubes to prevent a backward flow of fluid along the groin. The bed-clothing should be sufficiently folded back to leave exposed the necessary parts—vulva and outer border of the buttocks.

A warmed macintosh with a rolled-in border, to form a ridge of protection, is placed under the hip, so that it slightly lodges on the end of the knee pillow and is well grouped over the edge of the bed to form a gutter into a pail which has been placed on the floor beneath the buttocks. Sterile towels can then be arranged round the parts as desired.

A copious douche can thus be given without disturbing the patient or in any way soiling the bed, and the parts are

clearly available for such treatment as plugging the vagina. The patient should be dried thoroughly after the douche.

Tamponading the Vagina.

Vaginal tampons are prescribed for inflammatory conditions of the vagina, uterus, ovaries, Fallopian tubes, pelvic peritoneum, and pelvic cellular tissue, or as a means of controlling hæmorrhage from the uterus or vagina.

For Inflammatory Conditions.—A vaginal douche should be given both before the tampons are inserted and after they are removed, the vagina being dried very carefully with swabs, and any discharge that may still be clinging to its walls removed, in order that the drug with which the tampon is impregnated may be brought into contact with the inner surface of the vagina.

One method of making a tampon is to take a piece of absorbent wool 12 inches long and 5 inches broad, and to sew a piece of tape to one end. Whatever solution has been prescribed is poured over this strip of wool and allowed to soak thoroughly into it, the wool is then twisted up like a rope and is ready for use.

Another method is to make several small tampons about the size and shape of a hen's egg, or perhaps a little smaller, to which are attached pieces of silk or tape by which they can be removed.

When using tampons it is most important to see that the whole vagina is carefully packed and everywhere in contact with them.

Before tamponading the vagina, the patient should empty her bladder, or the urine should be drawn off by catheter. Especially is this of importance when the vagina is being plugged for hæmorrhage, in which case the tampons are inserted as tightly as possible and must be left in many hours. If then the bladder contains a fair quantity of urine when the plugging is inserted, the latter will have to be removed sooner than is desirable, in order that the patient may empty her bladder.

Tampons may be introduced either by means of a Sims's speculum and swab forceps or by placing the first and second fingers of the left hand in the vagina, separating the labia a little, and then inserting the tampon with the right hand. The fingers of the left hand are then withdrawn, and the tampon pushed up as far as possible with the first finger of the right hand. The tampons should always be carefully and firmly packed round the cervix, gradually filling up the vagina from above downward. The tampon is, as a rule, put in at night, and removed in the morning, and as the secretion caused by its use is often rather profuse, a diaper should be worn.

Medicated tampons for application to and around the cervix are best passed through a Ferguson's speculum with swab-forceps.

For Hæmorrhage.—In the case of hæmorrhage from the uterus or vagina a douche at 120° F. should first be given, and then medicated gauze or plain gauze dipped in biniodide of mercury (1 in 4000), lysol or monsol (1 in 320) may be packed into the vagina supposing tampons are not handy. If time is of great value and gauze is not obtainable, then it is best to use what is known as a kite-tail tampon. This is made by tying a number of pieces of cotton-wool about the size of hens' eggs to a tape, so that there shall be 4 inches of tape between each piece of wool, and this should be wrung out in an antiseptic solution.

It is preferable if the douching is being used for hæmorrhage to have the patient on her side. The clot can be cleared away and the plugging applied without further disturbing the patient (see Fig. 32).

Catheterizing the Bladder.

Although one of the simplest procedures, catheterization may, if carelessly performed, cause the patient many weeks of misery, and perhaps kill her, the great danger being that bacteria may be introduced into the bladder. If this happens cystitis is set up, and the inflammation may then extend up the ureters to the kidneys and kill

the patient, or infecting one kidney so disorganize it that its removal is imperative.

To prevent, therefore, bacteria being carried into the bladder, the nurse must thoroughly wash and scrub her hands, and then dip them into a solution of biniodide of mercury (1 in 2000), lysol or monsol (1 in 160); she must be sure that the catheter is sterile, and, lastly, that the vulva is clean.

In some cases, owing to inflammation of the urethra, a malignant growth, or urethral caruncle, the patient may experience acute pain when the catheter is passed. The doctor may order a few drops of a 10 per cent. solution of cocain, which will relieve the pain, to be injected into the orifice of the urethra with a glass syringe.

The best catheter to use is a glass one; if it is impossible to use this on account of some tumour pressing on the urethra, then a soft rubber catheter should be used. In either case the catheter should be well boiled before and after use, and in the interval it should be kept in carbolic acid (1 in 20). Special care must be taken with the soft rubber catheter to see that the eye is quite patent, and in both a stream of water should be passed through after use in order that the channel may be properly sluiced.

Apart from the urethra being the seat of inflammation, a caruncle or cancer, pain as opposed to discomfort, should not be experienced by the patient after the catheter is passed. In such circumstances pain means that the catheter is being passed roughly or in a wrong direction. Especially may there be some little difficulty in passing the catheter after the operation of anterior colporrhaphy, when the direction of the urethra may be somewhat altered. In such cases, in their endeavour to force the catheter into the bladder, nurses have punctured the floor of the urethra. The result has been a urethro-vaginal fistula, a most difficult injury to cure by operation and leading to great misery of the patient. For this reason, it is better after the operation of anterior colporrhaphy for the nurse to use a rubber catheter if the patient is unable to micturate.

The nurse having made her hands as aseptic as possible, the vulva is cleaned as follows: The patient being on her back with her legs drawn up and separated, the labia are held apart by the first and second fingers of the left hand, the wrist resting on the pubes, and the vestibule, containing the orifice of the urethra, exposed. The vestibule is well swabbed with biniodide of mercury (1 in 2000), lysol or monsol (1 in 160) by which means any bacteria contaminating this area may be removed and the risk of their being carried in by the catheter excluded. The nurse again surgically cleanses her hands, and exposing the vestibule once more with her left hand passes the catheter into the urethral orifice with her right hand.

A porringer should be placed between the patient's legs to receive the urine, and the catheter should be held in position with the labia separated until all the urine has passed. On the stream of urine diminishing and the fluid escaping in drops, the catheter is pulled out a little till the stream recommences to flow, and when a second time the drops appear then the bladder is practically empty, and the catheter is withdrawn. The thumb should be kept over the free end so that any urine remaining in the catheter will not be spilt over the patient or bed-clothes, and can be added to the rest of the urine in case there is any sediment; or the contents of the catheter can be added to a sterile test-tube if the doctor so desires.

The difficulties that may arise are due to the fact that after a prolonged or otherwise abnormal labour the orifice of the urethra is sometimes difficult to find; to some tumour preventing the passage of the catheter, or, much more commonly to the nurse, especially if she be inexperienced, failing to recognize the orifice of the urethra and passing the catheter into the vagina. If this happens, it need hardly be said that the catheter should again be sterilized before being used, or a better plan is to prepare two catheters in the first place so that if one is soiled the other is ready for use. To prevent the catheter being passed into the vagina it is a good plan, especially for

probationers, to place a swab in the vaginal orifice before passing the catheter. If the catheter has been used for a septic case it is much safer not to use it for any other.

Nurses should learn thoroughly the position of the urethral orifice, which may be difficult to detect if the parts are swollen.

It occasionally happens that when the abdomen has been opened the bladder is found to contain so much urine that it gets in the way of the gynæcologist as he is starting to remove the uterus. The reason the bladder is thus distended may be that the nurse did not pass the catheter properly, that the patient was left waiting for the operation longer than usual after the bladder had been emptied, or that owing to the position of the tumour, for instance a cervical fibroid, the nurse could not pass the catheter as easily as she is accustomed to. In the latter circumstance, it is the duty of the nurse to inform the operator of her difficulty. In fact, most careful gynæcologists will ask the nurse in every case, whether there has been any difficulty with the catheter. The reason for this is that if the operator is ignorant of the fact that the bladder may be distended, he can very easily cut into it when opening the peritoneal cavity. The nurse also would do well to remember that, if the bladder is found to be distended when the abdomen has been opened, she may be called upon to pass the catheter. Nothing is more pathetic than to see a nurse, whose job it really is to pass catheters on females when necessary, fail ignominiously, because the patient may not be in the exact position in which the nurse has generally passed the catheter, or because the nurse is ignorant of the relations of the vulva.

Washing Out the Bladder.

The following articles are required for washing out the bladder: A glass funnel to which is attached 4 feet of india-rubber tubing, a glass catheter with a small piece of rubber tubing, and a glass joint to which can be attached

the tube and funnel. A kidney tray to receive the urine, a porringer for receiving the return flow from the bladder, and a jug and thermometer for the solution. The apparatus should be sterilized, and then placed ready on a table by the side of the patient.

Before washing out the bladder its capacity should be gauged.

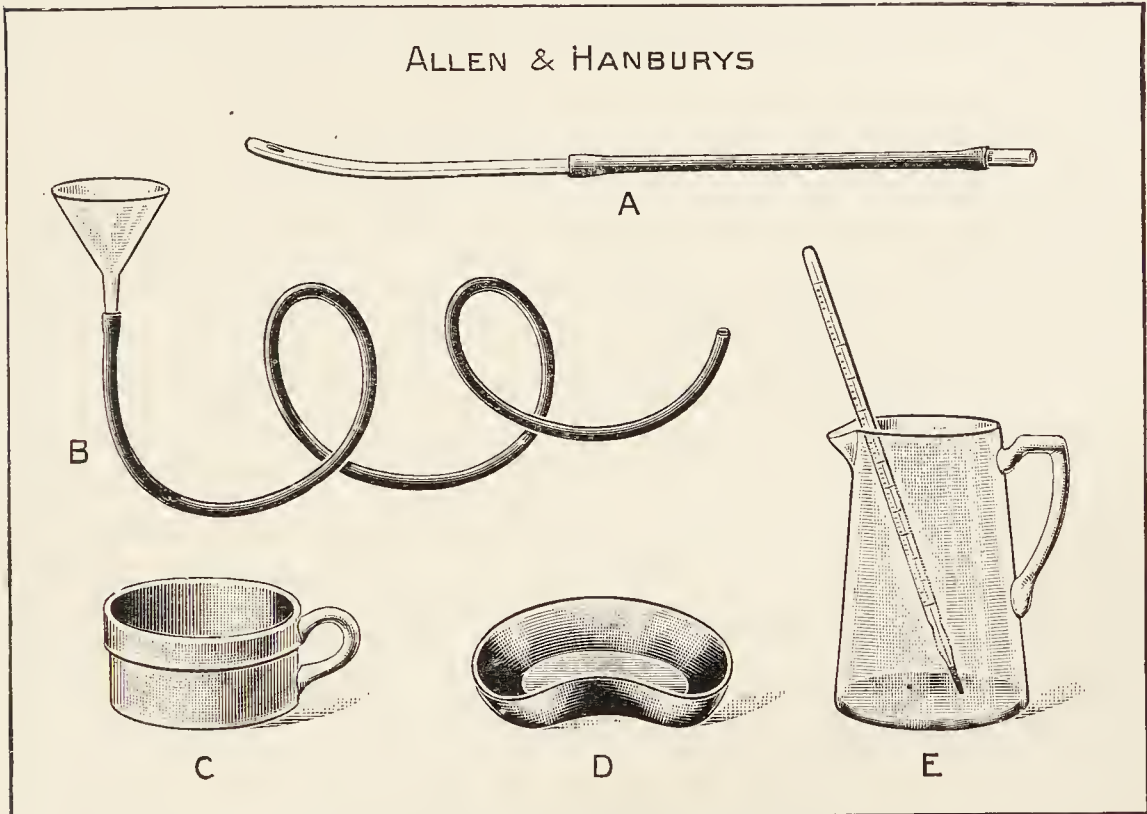


FIG. 40.—ARTICLES FOR WASHING OUT THE BLADDER.

- A. Glass catheter, rubber tubing and glass joint.
- B. Glass funnel and rubber tubing.
- C. Porringer for swabs.
- D. Kidney tray, urine.
- E. Glass or enamel measure and thermometer.

Method of Gauging the Capacity of the Bladder.—After the catheter has been passed with the precautions already noted and the urine evacuated the catheter should be withdrawn and another catheter with the tubing and glass funnel attached, which have been filled with sterile lotion to exclude air, is then inserted. This method is

much more comfortable for the patient than attaching the tubing to the first catheter inserted, since, unless the nurse is very expert and careful, the catheter will be moved unduly while the tubing is being affixed. The tubing is pinched below the funnel which is then emptied, after which the funnel is filled with the prescribed lotion and the fingers are removed from the tube. The solution is poured in slowly till it begins to rise back in the funnel showing the bladder is full. The tubing is at once pinched, the funnel lowered into a measured porringer, and the tubing unpinched, when the contents of the bladder will siphon out giving the capacity of the bladder.

To Wash Out the Bladder.—A solution of boric acid (1 in 20) or other prescribed solution, having been previously prepared, the bladder should be washed out with repeated amounts one ounce less in quantity than the proved capacity of the bladder. After the solution has remained in the bladder a short time the funnel is lowered and the solution allowed to run out. This is repeated until at least 2 pints of the solution have been used, the bladder being washed out twice daily until the cystitis is relieved. The temperature of the solution to be used should be between 100° F. and 105° F.

SALINE INFUSION.

Intravenous.—An intravenous saline infusion is often wanted in an emergency, and it is important, therefore, for the nurse to know what articles are required, since, in the circumstances in which such a method of treatment is used, the doctor will be attending to the patient in other ways and will have no time to superintend the preparations the nurse will be called upon to make.

An intravenous saline infusion is generally used when there has been a severe and rapid loss of blood, and it is necessary to make up the amount of fluid lost as quickly as possible. Such conditions, therefore, as post-partum hæmorrhage, intraperitoneal bleeding due to a ruptured tubal gestation, severe loss of blood during an operation or as the result of an injury, all call for this method of treatment.

The transfusion apparatus consists of a receptacle for the salt solution, an india-rubber tube, one end of which is attached to the receptacle and the other end to a cannula, which is slipped into the vein when it is opened.

A proper transfusion apparatus may not be available, in which case if the doctor has got a cannula, an irrigating porringer will suffice.

Normal saline solution is made by adding a teaspoonful of common salt to a pint of water and boiling the mixture. It should be kept at a temperature of 105° F. in the receptacle so that it will be the correct temperature, 100° F., when it flows into the vein.

The following articles must be procured and when necessary sterilized by the most appropriate method, and then assembled on a table covered with sterilized towels or on a sterilized tray :—

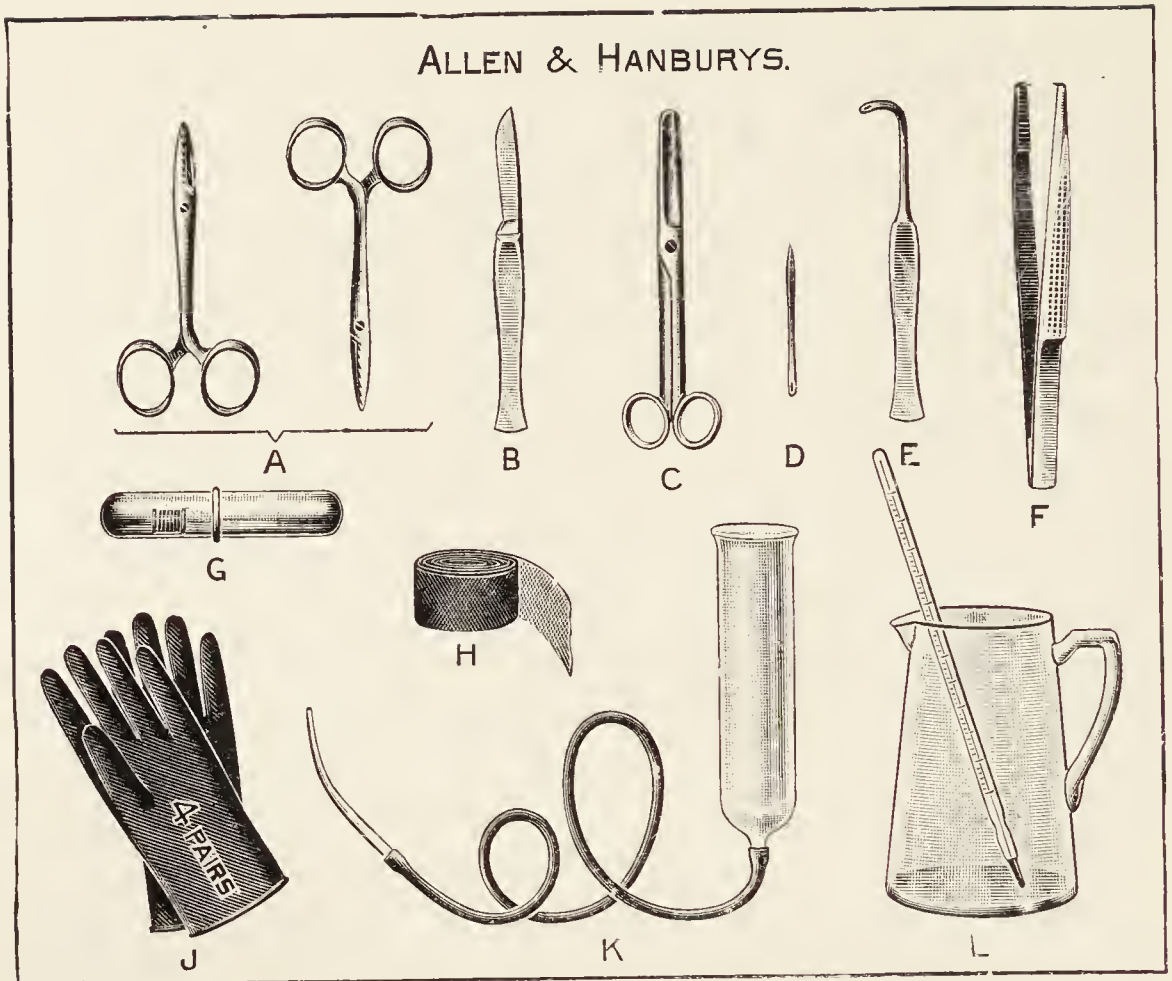


FIG. 41.—ARTICLES FOR INTRAVENOUS SALINE INFUSION.

- A. Two pairs of pressure forceps.
- B. A scalpel.
- C. Scissors.
- D. A suture needle.
- E. An aneurysm needle.
- F. Dissecting forceps.
- G. Catgut, ligatures No. 2.
- H. A bandage to constrict the upper arm.
- J. Gloves.
- K. The transfusion apparatus.
- L. A measure and a thermometer.

Sterilized swabs. Iodine solution. Saline solution.

Subcutaneous Saline Infusion.—By this method the saline solution is introduced into the cellular tissue of the body and from thence is absorbed into the blood.

It is a slower method than intravenous injection and

the solution in the receptacle should therefore be hotter. The temperature of the solution as it is introduced should be 105° F.

The solution may be run in under the breasts or into the thighs, other situations sometimes chosen are the axillæ or flanks.

The following articles must be procured and, when necessary, sterilized :—

Iodine solution.

A measure containing normal saline solution.

A glass funnel to which is attached 4 feet of india-rubber tubing.

An aspirating needle.

A thermometer.

Collodion and gauze for sealing the puncture after the needle is withdrawn.

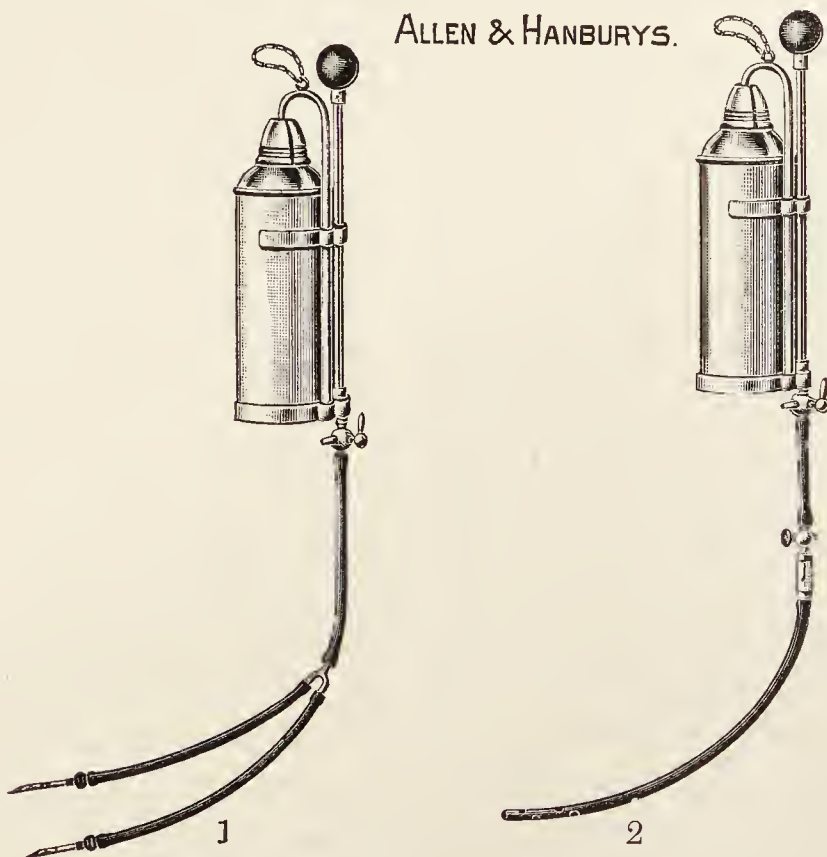


FIG. 42.—SOUTTAR'S "THERMOS" SALINE INFUSION APPARATUS.

1. For subcutaneous infusion.
2. For continuous rectal infusion.

If the nurse is directed to give the infusion, she must remember that while she is introducing the aspirating needle she should let a little of the solution escape. About a pint can, as a rule, be run into the cellular tissue without causing any undue distress from distension. After this amount is absorbed a further quantity may be introduced.

Continuous Subcutaneous Saline Infusion.—This method of treatment is used in cases of shock and of peritonitis or other diseases of a septic nature. It is particularly useful when the administration of fluid by the mouth or rectum is impossible, and it is necessary to introduce large quantities of solution. By this means from 10 to 20 pints may be introduced in the 24 hours, according to the absorbing powers of the patient. It is not advisable to allow the fluid to enter quicker than 10 ounces an hour owing to the discomfort resulting. Unless a proper instrument is available this is rather a troublesome method to carry out, owing to the difficulty of keeping the temperature of the solution uniform, and of regulating the rate of the flow.

The most convenient and best apparatus is a modification of a vacuum flask invented by Souttar, which keeps the solution at a uniform temperature, and requires but very little attention. The saline solution is run in by siphon action from the receptacle through an india-rubber tube to which is attached one or two aspirating needles, according to the pattern of the apparatus used. The needles should be retained in position by strips of adhesive plaster, and the exposed part of the body should be covered with wool pads to prevent the patient getting chilled. The rate of flow is regulated by the tap and observed on the gauge.

The great advantage in the use of this apparatus is the large quantity of saline that can be absorbed. Owing to its constant high temperature the saline is taken up at once into the vessels. There is rarely any swelling of the tissues and the renal excretion is increased.

In the absence of a vacuum flask, the temperature of the solution can be kept more or less uniform if an electric bulb, having been lighted, is tied to the side of the recep-

tacle. If electricity is not available, then the receptacle containing the saline solution must itself stand in a larger receptacle surrounded by water at a much higher temperature, so that the saline solution as it is introduced should be at a temperature of 105° F.

Intraperitoneal Infusion.—At the conclusion of an abdominal operation some surgeons before completely closing the wound in the parieties, pour into the peritoneal cavity two or more pints of saline solution. This is done more especially after the radical operation for cancer of the cervix.

The following articles will be required, and must be sterilized:—

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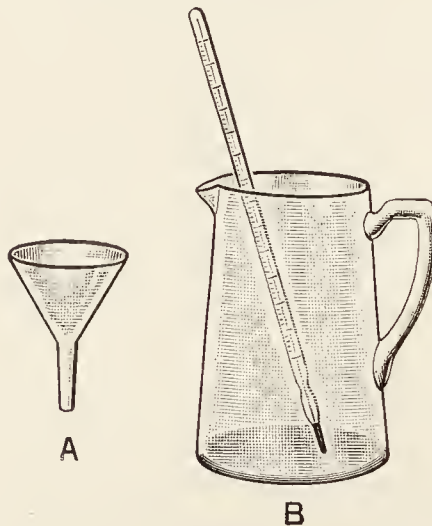


FIG. 43.—ARTICLES FOR INTRAPERITONEAL INFUSION.

A. Glass funnel.

B. Glass measure and thermometer.

The solution in the jug should be at a temperature of 105° F.

BLOOD TRANSFUSION.

- A. Keynes' flask.
- B. 2 Kimpton's tubes.
- C. Two-way suction pump.
- D. Paraffin wax.
- E. 2 Scalpels.
- F. 2 Tourniquets.
- G. 2 Dissecting forceps.
- H. Hypodermic syringe.
- J. 2 Aneurysm needles.
- K. 4 Blunt hooks.
- L. 2 Scissors, pointed.
- M. 8 Spencer Wells' forceps.
- N. Silk, No. 2.
- O. 2 Cutting needles.
- Sodium citrate solution, sterile.
- Brandy.
- Gloves.
- Solution of Novocaine.
- Tincture of Iodine.

The paraffin wax is for waxing the Keynes' flasks if these are used. Two tubes are required in case one breaks. The wax must be sterile and is dissolved in ether. The sodium citrate is to prevent the blood clotting. The brandy is for the donor, if necessary. The cutting needle is to stitch the skin incision.

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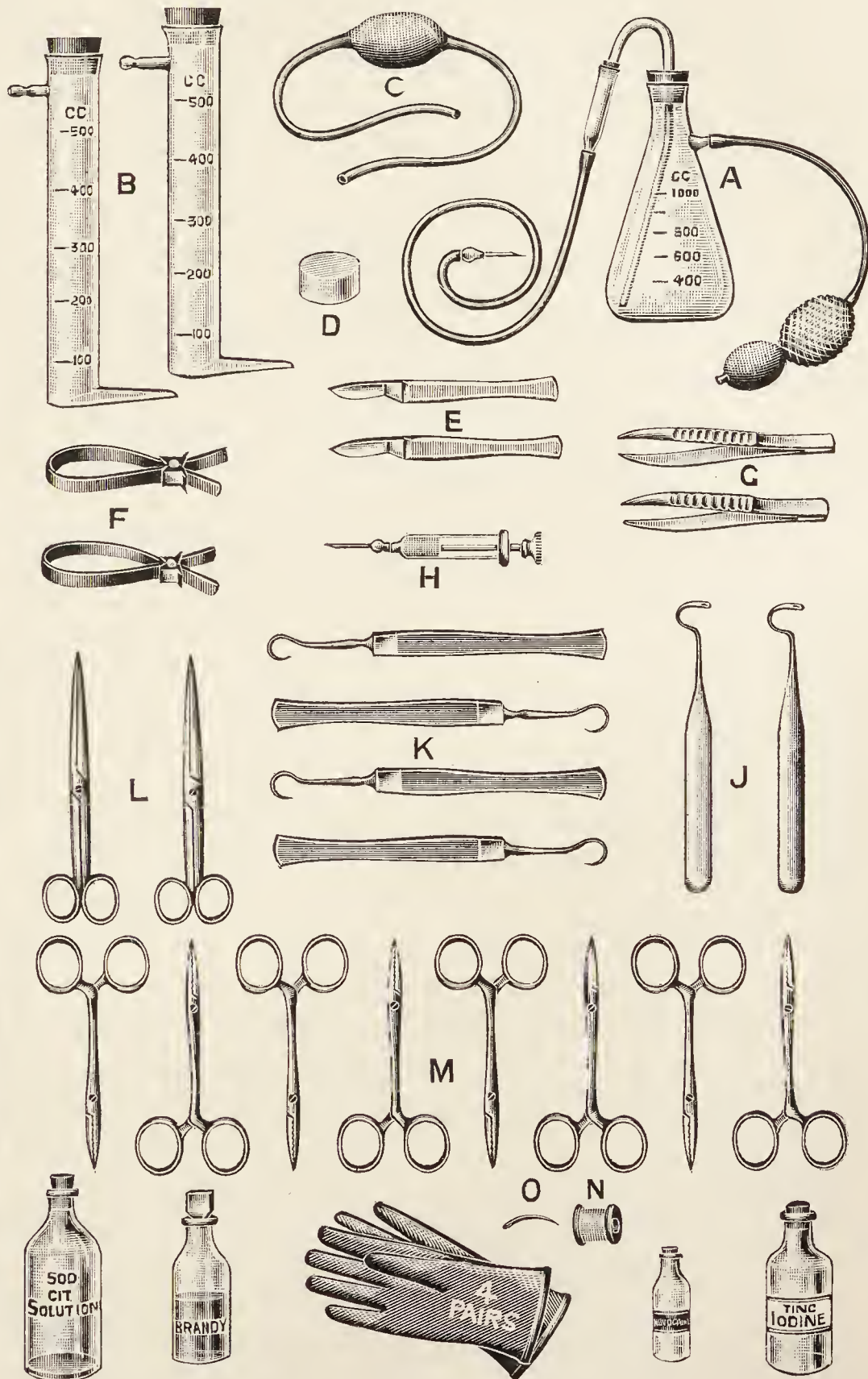


FIG. 44.

Rationale of Blood Transfusion.—People can be divided into four groups according to the action of the serum of their blood on the red blood corpuscles of each other. The effect may be that the red blood corpuscles are coagulated, or that they are hæmolysed, or there may be no effect at all. If the blood of one person was to be transfused into the blood circulating in another, and the red blood corpuscles of the transfused blood clotted, the result would be innumerable emboli in the circulation of the transfused person, leading to death. If, on the other hand, the red blood corpuscles hæmolysed, the transfused person would suffer from severe jaundice which is certainly not desirable. If the red blood corpuscles do not coagulate or hæmolyse, then the transfused blood agrees, as it were, with the blood of the transfused person.

The person who gives the blood to be transfused is called the *donor*, he or she who receives the blood is called the *recipient*.

From this it is obvious that the serum of the recipient should not belong to a group which will cause destruction of the red blood corpuscles of the donor.

How to Ascertain to which Group a Person Belongs.—The four groups, into one or other of which every person can be included, are numbered as follows:—

Group I. Known as the Universal recipient. People in this group can receive, without danger, blood from any man, woman, or child, but can give their blood, without danger, only to men, women, or children of their own group.

Group. II.

Group. III.

Group. IV. Known as the Universal donor. People in this group can give, without danger, blood to any man, woman, or child, but can receive blood, without danger, only from men, women, or children, of their own group.

To ascertain to which group anyone belongs some serum from a person who is known to belong to Group II or some

serum from a person who is known to belong to Group III is spread each on a separate slide. With each serum is mixed a drop of blood from the person it is wished to group. One or other of the following results will then occur:—

If a person belongs to Group I clumping will occur in the serum from the person known to be a Group II or Group III.

If a person belongs to Group II clumping will occur in the serum from the person known to be a Group III.

If a person belongs to Group III clumping will occur in the serum from the person known to be a Group II.

If a person belongs to Group IV there will not be any clumping.

Clumping is the term used for the coagulated or hæmolyzed red blood corpuscles which can be seen on the slide with the naked eye.

How to Choose a Donor.—There are two methods of procuring a suitable donor, the scientific and the empirical.

Scientific.—

1. Ascertain the Group number of the patient.
2. Procure a suitable donor.

The Group number of the patient is ascertained by the method described above. With this knowledge the following table will show how to procure a suitable donor.

Patients in Group I can receive blood without risk from donors in Groups I, II, III, IV.

Patients in Group II can receive blood without risk only from donors in Groups II, IV.

Patients in Group III can receive blood without risk only from donors in Groups III, IV.

Patients in Group IV can receive blood without risk only from a donor in Group IV.

The commonest group is II, the next IV, the next III, the rarest I.

There is now in most large towns a list, divided into these four groups, of people (donors) who are willing to give the required amount of blood. This list is kept by the hospital

authorities, and in London also by the Red Cross Society. If, therefore, a patient requires a blood transfusion his or her group having been ascertained, a suitable donor can be obtained in accordance with the above list.

Empirical.—If such a list, or a donor whose group is known, is not available, then the serum of the patient, whether his or her Group number is known or not, must be tested against a drop of blood from any person who has volunteered to be a donor. If the red blood corpuscles of the volunteer donor clump, the blood of other volunteers must be tested until their red blood corpuscles do not clump, which signifies that a suitable donor has been found.

As a rule the empirical method is followed, one or more members of a patient's family volunteering to be donors unless such service is not available.

Method of Blood Transfusion.—The apparatus and instruments having been prepared and a suitable donor obtained, the blood is transfused as follows. It is best to have the donor and recipient in the same room, if possible near each other, with a screen intervening. A vein of the recipient is first exposed and ligatured at its distal end, ready to be opened when the donor's blood is available. A vein of the donor is then opened and the requisite amount of his or her blood is received into the Kimpton's Tube, or Keynes' Flask, whichever is being used.

The blood of the donor is then carried to the side of the recipient and his or her vein is opened and the donor's blood pumped into the vein, from Kimpton's tube or run in if a Keynes' flask is being used.

Duties of the Nurse.—The instruments are sterilized in the ordinary way. Kimpton's tubes or the flasks are sterilized by being wrapped in a towel and then placed in the sterilizer in cold water (to prevent cracking) which is then brought to the boil. After use the tubes or flasks are immediately cleaned with cold water and small blood clots are removed with hydrogen peroxide, 10 vols. The nurse may have to assist the surgeon to wax Kimpton's tubes. The instruments for opening the veins must be divided into

two lots, one for the operation on the donor, the other for the operation on the recipient. The nurse will have to arrange the arms of the donor and recipient in their proper positions and suitably covered with sterile towels. The nurse may be asked to work the suction pump, and she should also keep an eye on the donor so as to administer brandy if necessary.

DEEP X-RAY THERAPY.

Deep X-ray therapy is employed in gynæcological practice for the treatment of serious hæmorrhage due to fibroid tumours of the uterus or to chronic metritis (fibrosis uteri) or because of the size of the tumour. This method of treatment is also employed, with or without radium, for cancer of the neck of the uterus and as a prophylaxis after the radical operation for this disease, and after the removal of malignant ovarian tumours, with the purpose of destroying any cancer cells that may have escaped removal at the operation.

The present position in England of this method of treatment is, in some ways, unsatisfactory, especially in cases of malignant disease, since in a large number of instances the radiologist is asked to treat the patient only after the surgeon has done all he can, or when the disease is so far advanced that the radiologist cannot do anything.

This much may be said. In the case of chronic metritis and of some fibroid tumours of the uterus, deep X-ray therapy will arrest the bleeding by causing atrophy of the ovaries and so inducing the menopause. As regards the treatment of fibroid tumours these must not present any symptoms or signs of degeneration and must not be so large that the size of the tumour is the reason why the patient has sought relief, since the shrinkage resulting will probably not be sufficient to relieve her to any extent.

As regards the treatment of cancer, radium alone gives better results than X-rays alone, but in the hands of some Continental experts the best results are said to be obtained with a treatment combining the use of radium and of X-rays.

There is a distinct danger associated with deep X-ray therapy, unless given by an expert, namely burns, which are very serious and take many months to heal. Another danger is that of a patient who is bleeding being thus treated for chronic metritis or fibroid of the uterus before a previous curetting has indicated that the bleeding is not due to malignant disease. Moreover, some pelvic or abdominal tumours may appear to be fibroids on clinical examination when they are really ovarian or inflammatory in nature. Patients on many occasions, more particularly in the early days of X-ray therapy, have been thus treated with a very unfortunate result.

Lastly on occasions during the shrinkage of the uterus in a case of a fibroid, the latter has been squeezed into the cavity of the uterus and become polypoid, and has had to be removed by an operation.

There is also serious danger to nurses working in X-ray departments if they are careless. In a well-ordered department nurses will be given strict injunctions what they may do and what they may not do, and their blood will be examined every three months. With such precautions, there is no appreciable danger.

Preparation of the Patient.

Day Prior to the Treatment.—The patient should be directed to drink plenty of water, barley water, or lemonade, and her diet should consist of clear soup, boiled fish, boiled chicken, milk pudding or custard; or as near to such a diet as she can obtain. At any rate the meals must not be "heavy." No potatoes or pastry are allowed. An aperient is not required if there is a good morning action of the bowels, otherwise an enema should be given. A mixture of 10 grains of calcium chloride in half an ounce of peppermint water should be taken after the three regular meals. No metallic drugs must be given.

Day of the Treatment.—The breakfast should consist of a cup of tea and some toast and butter, and in addition the patient should drink plenty of one or the other of the

aforementioned fluids. One dose of the calcium mixture should be taken after breakfast.

After Treatment.—The patient should rest for the remainder of the day. If sickness supervenes she should be given a teaspoonful of bicarbonate of soda in half a tumblerful of water, and this can be repeated.

The meals after treatment should, for the next two or three days, be of the nature of those indicated for the day before the treatment.

Duties of the Nurse.—During the treatment the nurse remains outside the closed cubicle, keeping the patient under constant observation through the window, so as to be available if the patient wants her.

Signs of Reaction to the Treatment.—Malaise, nausea, and vomiting.

The above description has reference to the routine in use at the X-Ray Department of the Middlesex Hospital. Radiologists differ in their methods of treatment a good deal, especially with respect to the length and number of applications, and such information, therefore, is not detailed.

APPLICATION OF RADIUM OR RADON.

The salt of radium (radium bromide), or its gas (radon), is used, in gynæcological practice, to arrest hæmorrhage in cases of chronic metritis, which it does by its action on the ovaries, and so inducing the menopause. It is used also for the treatment of cancer of the neck of the uterus. The result of its use in cases of chronic metritis is very successful, and most of the patients, who a few years back would have had the uterus removed for the serious bleeding, are now cured by one application of radium bromide, or radon. Radium in the treatment of cancer of the neck of the uterus has been employed on the Continent, especially in France, Germany, and Sweden, for some years, and according to the reports most successfully. In England the same success up till now has not been attained, this no doubt being due to three principal causes. The first that

the large amount of radium used in the Continental Clinics has not been available in England, the second that English surgeons have not favoured this method of treatment owing to the bad results obtained, and thirdly that many of these bad results, at anyrate, were due to a faulty technique. From the published Reports on the radium treatment of cancer of the neck of the uterus on the Continent, it would appear that this treatment compares favourably with the radical operation, both as regards cures and prolongation of life in the uncured, while the death-rate is under 1 per cent., in contra-distinction to that of the most expert operators of 15 to 19 per cent. On the other hand, the Continental radiologists do not appear to treat such advanced cases as some of the English surgeons, and many of the Continental experts will not treat one particular variety of cancer of the neck of the uterus (columnar celled) or cases that are septic, whereas the surgeon operates on such cases; his mortality, therefore, must be very considerably higher. In cases classified by the Continental experts as Group I the operative mortality is 5 per cent.

INSERTION OF RADIUM.

- A. Clover's crutch.
- B. Sims's speculum.
- C. Auvard's speculum.
- D. 4 Towel clips.
- E. Curette.
- F. Ring forceps.
- G. Dissecting forceps.
- H. Volsellum.
- J. Uterine sound.
- K. Fenton's dilators 1 to 6.
- L, M. Radium in india-rubber bag.
- N. Silkworm gut.
- O. Silk.
- P. Gloves.
- Gauze.
- Specimen bottle.
- Benzine.
- Tincture of iodine.

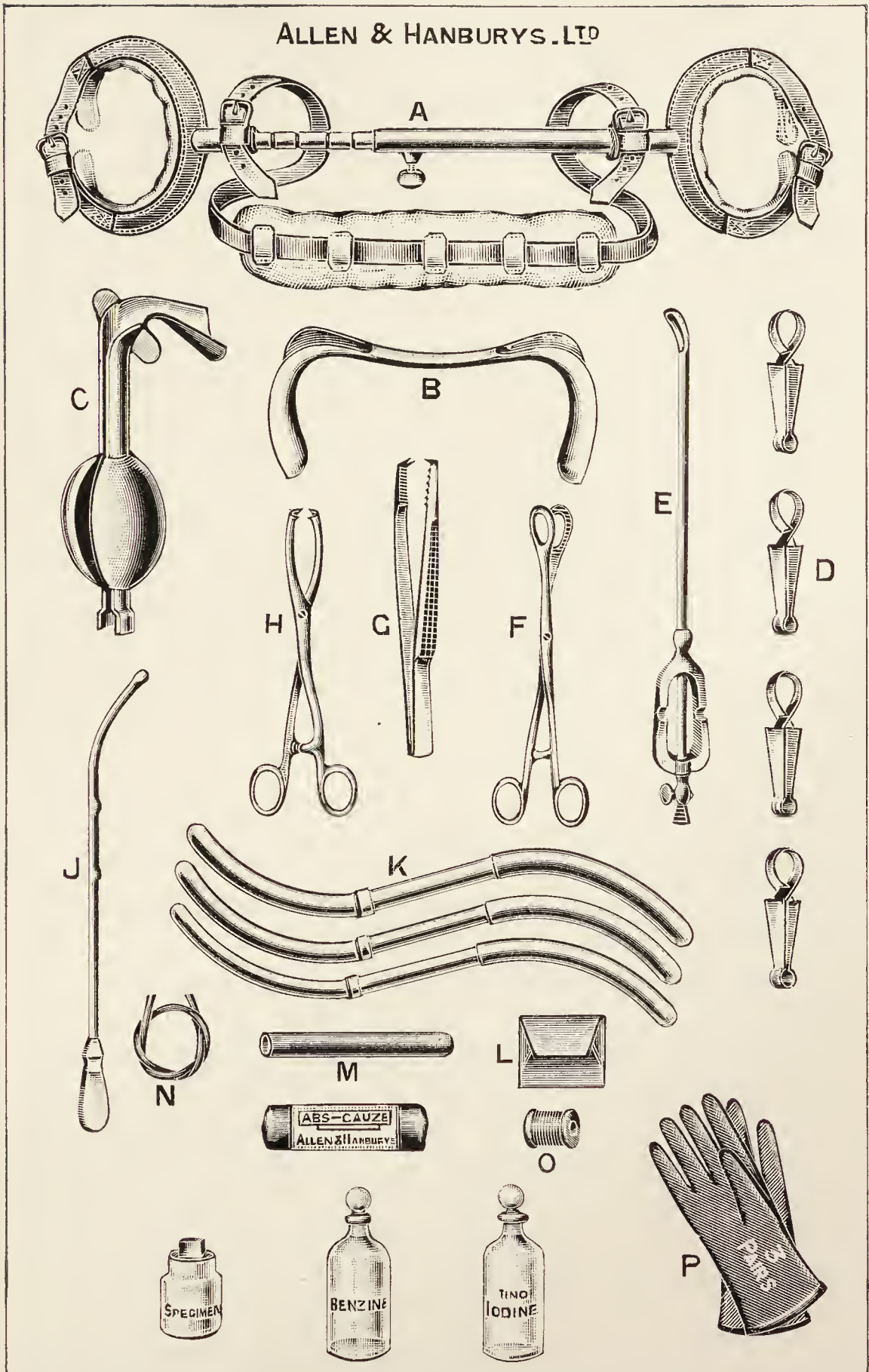


FIG. 45.

The sharp curette is to remove a specimen from the uterus for microscopical examination from a patient who is to be treated with radium for chronic metritis, so as to ensure that the presence of cancer of the body of the uterus is not missed; or to dig a piece out of the neck of the uterus in cases of cancer so that it can be microscoped. The ring forceps is to insert the gauze into the vagina after the applicators of radium have been inserted. The india-rubber bags are to cover the applicators. The silk to tie the covering on, and the silkworm gut to tie on to the applicators so that these can be pulled out. The benzine is to swab out the vagina in cases of cancer. The tincture of iodine for the same purpose in cases of chronic metritis.

The specimen bottle may be required because when the radium is being used for excessive bleeding only, the uterus is always curetted first, to ascertain whether malignant disease is absent or present, and the specimen removed may require microscopical examination. When radium is being used for cancer of the cervix the specimen bottle is required since a piece of the growth is always removed for microscopical examination and record.

The gauze is to plug the vagina and to prevent the applicator slipping out of the uterus, and in the case of the vaginal applicators the gauze is also used to separate them from the vaginal wall.

Preparation of the Patient.—As for a curetting. In addition a label must be attached to the patient on which is written the number of applicators, or needles, inserted.

Duties of the Theatre Sister or Nurse.—The instruments are sterilized in the usual way. The radium bromide, or radon, will be delivered to the nurse in applicators made of platinum, silver, or silver and lead as the case may be. Silkworm gut is threaded through the eyelets of the various applicators and tied in, after which the applicators are inserted in special india-rubber bags and tied in these with silk, the unattached ends of the silkworm gut hanging free; the whole is then sterilized by boiling and placed in a sterilized tray ready for use.

For the treatment of fibrosis the radium is inserted into the cavity of the uterus only; for the treatment of cancer it is inserted into the uterus and also into the vagina up against the growth.

The exact quantity of radium, its method of application, the number of applications and the number of hours it is left *in situ* depend upon the individual gynæcologist, and is no concern of the nurse. As a rule one insertion is sufficient in cases of fibrosis uteri, and those experts who have had the most experience with the use of radium in cancer of the cervix are of the opinion that three applications, and three only, are required, the second at the end of the first week and the third four weeks later.

After Treatment.—The applicators are left in the uterus and vagina in cases of cancer, or in the uterus only in cases of chronic metritis, as long as the surgeon directs.

In cases of fibrosis the patient is quite able to return home on the third day if she wishes.

When cancer of the cervix is being treated the patient is kept in bed for the first seventeen days and for four days after the third application.

Many patients complain of headache and nausea following the use of radium, and its use in cases of fibrosis is always followed by a brownish discharge for some weeks.

During the time the radium, or radon, is in position there are certain rules which must never be broken:—

1. The patient must not leave her bed on any pretext whatever.

2. Any dressings removed from the patient are never to be thrown away or destroyed until all the applicators have been accounted for.

3. All excreta (urine and fæces) must be examined before being thrown away in case an applicator has slipped out.

4. The number of applicators, or needles, must be checked with the number written on the label attached to the patient. This rule does not apply to the nurse unless she has been directed to remove the applicators.

5. Any discrepancy between the number of applicators

received and that entered on the label must be at once reported to the surgeon.

6. Radium, or radon, must be handled as little as possible, wooden forceps being used unless fingers are absolutely necessary. When fingers must be used, as when the applicator has to be placed in the rubber bag, the manipulation should be done by two people.

7. In the event of the applicators slipping out of position, and if this is discovered, the surgeon is to be communicated with at once, no matter the hour of the day or night.

Dangers.—There are three dangers associated with the use of radium, or radon: the loss of the radium or platinum tube containing the radon, burning of the patient, damage to the blood of the people handling it.

1. The radium, or radon, in its applicator, or the platinum tube containing the radium, or radon, may be lost by being thrown away in the excreta or dressings, and it is for this reason* that some of the above rules were made. To lose radium in this way is no laughing matter—it costs nearly £12 a milligram. Radium may be “lost” temporarily if the material used for pulling out the applicator, or needles, breaks, in which case great difficulty may be experienced in removing the radium if it is buried in the tissues and much inconvenience if the applicator is in the uterus, meaning perhaps another anæsthetic. Moreover, the patient may be nervous, or “troublesome,” and refuse to have anything further done. The author once had such an experience. The silk attached to a bunch of needles buried in a cervical growth broke as the sister was pulling on it to remove the radium, which was not only worth £3000 but would also have killed the patient if left *in situ*. The patient refused to have any further treatment, and in spite of the entreaties (one may say) of the sister, nurses, resident medical officer and house surgeon, the patient got up, dressed, and expressed her intention of leaving the hospital after dinner. The author arriving at about that time persuaded the patient to let him examine her in the dark room under X-rays. This was agreed to, and the radium

was observed to be in the broad ligament, having moved from its original position. With a little more persuasion the author was allowed to pass a pair of forceps up the vagina, through the growth which was very advanced, into the broad ligament. The end of the forceps could then be seen as well as the radium tubes, which were grasped and removed. It was after this experience that silkworm gut was substituted for the silk. Other surgeons have had the same experience of the silk breaking.

2. If the uterine applicator slips out of the uterus into the vagina, the latter may be burnt. This is guarded against by packing the vagina with gauze after the uterine applicator is in position. If the vaginal applicators are not properly protected by gauze inserted between the applicators and the vaginal walls, or if the radium, or radon, is not properly screened, the vagina may be burnt.

Although the radium, or radon, in its tube is well protected (screened) by being enclosed in an applicator made of platinum, silver or lead and then covered with india-rubber, it is very important to take every precaution with the gauze packing, since many cases of burns have resulted from the radium resting in the vagina which has not been suitably protected.

It is for this reason that the rule has been made that the nurse must at once inform the surgeon if she has any reason to believe that the applicators or needles have slipped, which they may have done if the vaginal packing has come out or partly come out. On more than one occasion, not in the author's experience, this has happened, resulting in the formation of a vesico-vaginal or recto-vaginal fistula, which either never healed or took several operations to close.

Very occasionally the use of radium in septic cases has set up a pyosalpinx and pelvic peritonitis, and this has had to be dealt with surgically.

3. There is no danger to the nurse in the occasional handling of the radium, or radon, in the applicators or tubes, but unless the strictest precautions are taken by those who have the preparation of the radium, or radon, applicators and needles for insertion into the vagina, a serious

disease of the blood may result. The blood of those continually handling radium bromide, or radon, is therefore examined every three months, as also should be the blood of any nurse attached to a radium department and who is constantly handling the needles or applicators containing the radium bromide, or radon.

NOVARSENOBILLON INTRAVENOUS INJECTION.

- A. Syringe, glass 10 c.c.
- B. Syringe needle, 2 inches long, with wide bore.
- C. Syringe needle, $1\frac{1}{2}$ inches long, with narrow bore.
- D. Tourniquet.
- E. Hypodermic syringe, containing 1 c.c. adrenalin (1 in 100).
- F. Bandage.
- G. Novarsenobillon, ampoules of.
- H. File to open ampoules.
- J. Spencer Wells forceps.
- K. Glass measure.
- L. Glucose mixture.
- M. Beaker of warm sterile water.
- N. Gloves.
- Tincture of iodine.
- Collodion and brush.

The following mixture :—

Rx	Glucose	.	.	.	.	.	.	.	5	14
	Sodii Bicarb.	.	.	.	.	.	.	.	gr.	15
	Ol. limonis	.	.	.	.	.	.	.	℥	i
	Aq. ad	.	.	.	.	.	.	.	℥	iii

The glass syringe is for the arsenic solution. The 2-inch needle is to draw up the solution from the medicine glass. The $1\frac{1}{2}$ -inch needles are to inject the solution into the vein. The tourniquet is applied to the upper arm to make the veins stand out. The forceps is to secure the tourniquet. The hypodermic syringe is held in readiness for any vascular symptoms that may arise.

Duties of the Nurse.—The syringe and needles are sterilized by being placed in cold water which is then brought to the boil, or they may be kept in a jar of methylated spirit. The points of the injection needles must be sharp, and

wires must be kept in the needles when not in use. If the syringe and needles have been kept in spirit they must be well washed through with distilled water before use. The nurse may be directed to release the tourniquet.

Preparation of the Patient.—The urine should be tested for albumin, and if this is present the doctor must at once be informed. An aperient is given the night before followed

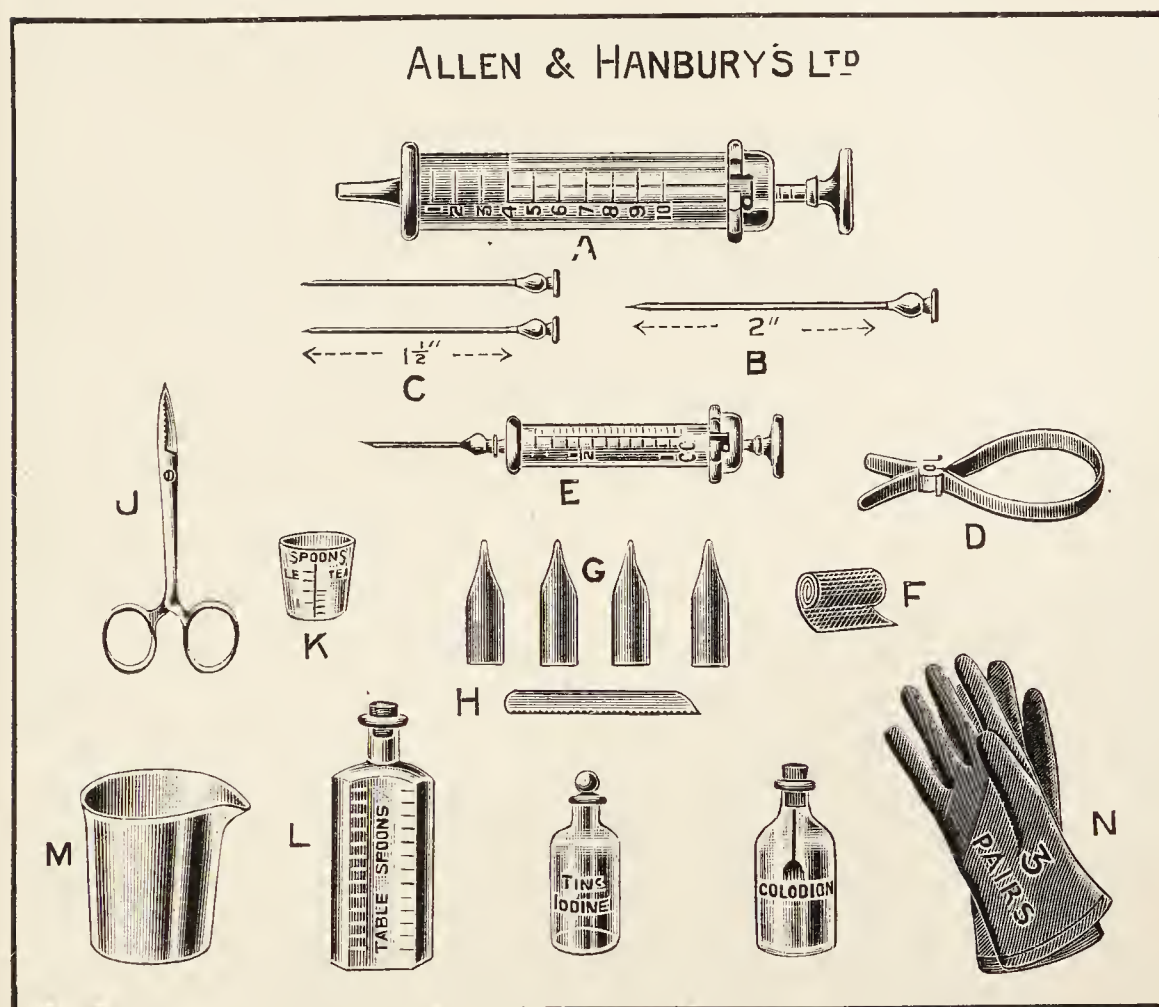


FIG. 46.

by Epsom salts, or an enema, in the morning. It is very necessary that the bowels should be acting quite regularly, if not a preliminary treatment with this object in view must be prescribed. No food is to be given for two hours before the injection. Fifteen minutes before the injection the glucose mixture is given.

Reactions.—Rarely during, or immediately after, the injection of novarsenobillon certain vascular disturbances

arise. The face becomes flushed, the pupils dilate, the voice is husky, there is tightness of the throat and pain in the chest, such symptoms are not serious. More rarely still dyspnœa, shivering, palpitation, vomiting and occasionally coma may supervene. Patients of plethoric type are most likely to have such reactions, and in them a prophylactic injection of adrenalin 1 c.c. is given five minutes before the injection. In some patients a taste of garlic supervenes on the injection, in which case the patient should be rested before being sent home and further doses of glucose prescribed.

There are certain, but well-marked, symptoms which may occur up to two days after the injection and late symptoms may arise up to one month. These concern the doctor.

CHAPTER XXI.

PRE-OPERATIVE EXAMINATION AND PREPARATION OF THE PATIENT.

BEFORE being subjected to any operation the patient must be prepared, and such preparation should include rest in bed, a report on the pulse, temperature, and respiration, douching, shaving, bathing, and preparation of the skin over the operation area. In addition, the bowels, bladder, and dress have to be attended to, and the urine should be tested, and if possible the quantity passed measured, while the patient must not take any solid food for several hours before the operation.

Rest.—In all cases, if possible, the patient should be kept in bed for the twenty-four hours before the operation. For the operation of posterior colporrhaphy and perineorrhaphy it is better to increase this period to two days at least, so that the bowels may be well emptied. Lastly, patients suffering from cardiac, pulmonary, or renal disease, or from the effects of uterine hæmorrhage, may, when an operation is indicated, require a longer rest than this.

Pulse.—The rate and character of the pulse should have been noted carefully as long as possible before the operation and its frequency charted regularly twice daily. Such a procedure is most important. Some nurses are apt to be careless in not charting the pulse-rate before the operation, and it may be that during this time the rate has been above or below normal. After the operation a similar rate continuing, the operator may be puzzled as to its cause when after all it may be the normal for that particular patient.

Respiration.—The respiration rate should be charted, and if the patient is troubled by a cough this should be reported.

Temperature.—The temperature should be charted twice daily unless the doctor orders this to be done more frequently. The same remarks apply as to the importance of recording the respiration-rate and temperature before the operation as to that of recording the pulse-rate.

Mouth.—It is very essential that the mouth and teeth should be attended to, if possible, before an operation so that if the teeth are decayed and, if there is time, a dentist should be consulted. Certainly some cases of septic pneumonia, after operations, can be traced to the filthy state of the patient's mouth.

The patient must be made to clean her mouth and teeth with some efficient mouth-wash, and if she is too weak to do this the nurse must do so for her with dabs of wool soaked in glycothymoline and held by forceps.

Urine.—It is very necessary that a proper examination should be made of the urine before the operation. It may be highly dangerous to operate on patients suffering from such diseases as diabetes or nephritis, and these conditions may not be suspected until an examination of the urine discloses the fact that it contains albumin, pus, sugar or blood.

If such an examination is not made cystitis, for instance, if present, may be attributed to the carelessness of the nurse if she has had to pass a catheter.

The following tables will serve as a guide for the examination of urine :—

1.—Ascertain the Quantity from which the Specimen is taken.

Normal amount is from 40 to 60 ounces in twenty-four hours.

The quantity of urine is decreased with :—

Fever.

Heart disease.

Acute nephritis.

Some cases of chronic nephritis.

Peritonitis.

Severe hæmorrhage, vomiting or diarrhœa.

By certain drugs such as opium or ergot.

Some surgical diseases of the kidneys.

After an abdominal operation the quantity of urine passed for the first day or two will generally be less than normal, due to the fact that the patient will not be taking much liquid.

In certain cases of shock after operation the quantity of urine passed is markedly reduced. This is especially noticeable after the radical operation for carcinoma of the cervix uteri.

The quantity passed in the natural way may also be reduced if there is a vesico-vaginal fistula or a uretero-vaginal fistula, complications due to sloughing after a difficult operation involving the ureters and bladder, such as in some cases of cancer of the cervix.

If one or both ureters are tied in the course of an operation, a very rare accident that may occur for instance during the operation of anterior colporrhaphy, the amount of urine will be decreased in the first case and no urine will enter the bladder in the second.

The quantity of urine is increased with—

Diabetes.

Hysteria.

Most cases of chronic nephritis.

When a quantity of fluid is taken and by the action of certain drugs such as acetate of ammonia, potassium citrate, and digitalis.

2.—Notice the Colour, the Clearness, and the Presence or Absence of Deposit.

A slight cloud due to mucus is normal.

(a) *The specimen is clear.*

Normal urine is a clear straw colour.

It is darkened if the quantity of urine is diminished and pale when the quantity is increased.

Bile colours urine very dark olive-green.

Blood from the kidney colours the urine black, or gives it a smoky appearance, according to the quantity of the blood.

Blood from the bladder colours the urine red.

Certain drugs colour urine, *e.g.*, carbolic acid turns it olive-green.

(b) *The specimen is not clear.*

The cloudiness or deposit may be due to—

Urates (when the cloud will disappear on boiling).

Pus.

Mucus.

Phosphates.

Blood in quantity.

Urates are usually yellow or brick-red in colour.

Their presence is of little importance.

They occur in febrile states, and in health in concentrated urines, as for instance after vigorous exercise.

3.—Test the Reaction.

Acid urine turns blue litmus paper red and has no effect on red litmus paper.

Alkaline urine turns red litmus paper blue and has no effect on blue litmus paper.

Normal urine is acid.

It may be alkaline after a meal, especially of vegetable food; in some cases of cystitis; while the patient is taking certain drugs such as citrates, and also from decomposition on exposure to air. If the urine is alkaline it must be made acid by a few drops of dilute acetic acid before applying further tests.

4.—Take the Specific Gravity.

See that the urinometer floats and stands clear of the sides of the vessel : read the number with the eye on a level with the surface of the urine.

The normal specific gravity is between 1015 and 1025.

A low specific gravity may be only temporary ; if permanent it suggests kidney disease.

A high specific gravity with pale urine suggests diabetes.

5.—Examine for Substances in Solution.

These may be—

Phosphates.

Albumin.

Blood.

Bile.

Grape sugar (also called glucose and dextrose).

The presence of one substance does not preclude that of another.

A. Begin with the heat test.

Fill a *clean* test tube for about 3 inches with the specimen of urine : hold the tube over a spirit lamp so that the upper half of the urine is boiled, leaving the lower half cool to compare it with. If the boiled portion be *clear* the urine does *not* contain phosphates, albumin, blood, or pus. If the boiled portion be *cloudy* it probably contains phosphates or albumin. Add a few drops of dilute acetic, or one drop of nitric acid, when if the cloud is due to phosphates it will disappear, as the acid dissolves phosphates and not albumin.

Phosphates and Albumin become apparent at boiling-point and Urates disappear.

B. If albumin is suspected *and the urine is clear, the nitric acid or sulphosalicylic acid test may be applied.*

Pour a small quantity of nitric acid into a clean test tube; allow a similar quantity of urine to trickle steadily down the side of the test tube. Where the two fluids meet a ring of coagulated albumin is seen.

Pour a few drops of sulphosalicylic acid into the urine. If albumin is present small "cloudy streams" will be seen sinking to the bottom.

The quantity of albumin may be ascertained by Esbach's albuminometer. This is a graduated test tube. Filter the urine if not already clear, and if alkaline render it slightly acid with dilute nitric acid. If the specific gravity is 1010, or over, dilute the urine sufficiently to reduce the specific gravity below that level. Fill the tube with urine up to the mark (U). Add the reagent (Esbach's solution of picric acid and citric acid) up to the mark (R). The tube is then gently inverted a few times to allow the fluids to mix, after which it is corked and kept standing upright for twenty-four hours. The albumin that is deposited is read off on the graduated marks, which represent grammes of dried albumin per litre of urine. The percentage of albumin is obtained by dividing by 10. Allowance must be made if the urine has been diluted before the estimation was undertaken.

C. *Test for blood.*

If urine containing albumin is smoky, red, or coffee-coloured, blood may be suspected.

Pour some urine into a test tube and add one drop of tincture of guaiacum, then add an excess of ozonic ether letting it run down the side of the test tube: if blood is present a *blue ring* will form where the fluids meet.

D. *Bile in the urine* in any quantity always colours it. Run a few drops of urine from a pipette on to a white tile and beside them a few drops of strong nitric acid; allow the urine and acid to run together; where the two fluids mix a passing play of colours, of which one *must* be green, will appear if bile be present.

Another method is to mix some urine to the equal parts of tincture of iodine and methylated spirit. The mixture will go green if bile is present.

E. *Test for sugar.*

If the urine is pale, increased in quantity, and of high specific gravity, sugar should be suspected.

A small quantity of freshly made Fehling's solution is poured into a test tube and boiled, an equal quantity of urine is then added and heated—an orange-red deposit proves the presence of sugar. Instead of Fehling's solution, its component parts may be used separately—the liquor potasse and the urine being boiled together first and a few drops of sulphate of copper solution then added; if sugar is present the result will be the same.

The quantity of sugar may be estimated by the *fermentation test*. Take the specific gravity and place the urine in a corked bottle with a small quantity of German yeast, leaving a hole in the cork. Leave the bottle in a warm place for twenty-four hours, then use

the sugar test to be sure that the sugar has all disappeared, and if such be the case subtract the present specific gravity from that of twenty-four hours ago and the difference is a rough estimate of the number of grains of sugar in each ounce.

The specimen for this estimation must be taken from the collected quantity passed in twenty-four hours.

The nurse must remember that a vaginal discharge of blood or leucorrhœa may easily contaminate the urine as it is being passed, in which case the test for these substances would be positive. There is no chance of the nurse failing to remember this in the case of a vaginal discharge of blood (menstruation, etc.), as she will see the blood when attending to the patient. A leucorrhœal discharge, however, may easily escape notice, and if, therefore, only a little albumin is found on testing the urine the doctor will require a catheter specimen. A large quantity of albumin will not be due to leucorrhœa.

6.—Examine the Deposit.

Having excluded urates, the deposit may be *pus* or *mucus* (with phosphates), or *blood* in quantity.

Pour the fluid away and to the deposit add an equal quantity of liquor potasse and shake. If pus is present the mixture will become thick and ropy.

Another test is to add ozonic ether to the deposit, and if pus is present bubbling will take place.

Douching.—The method of giving a douche is described on page 268.

Whether the patient should be douched or not, will, of course, rest with the doctor. Unless the patient is bleed-

ing, or has an offensive discharge, it is best to dispense with this treatment and to swab instead the operation site and its immediate neighbourhood with a solution of iodine and rectified spirit.

Bath—Shaving—Preparation of the Skin.—See pages 333 to 338.

Bowels.—*Minor and Major Operations.*—Two nights before the operation an efficient aperient should be given to the patient, so that her bowels may act thoroughly. Some surgeons prefer castor oil, others some such mixture as the following which is very efficacious :—

Sulphate of magnesia	.	.	.	.	4 drachms
Sulphate of soda	.	.	.	.	1 drachm
Extract of liquorice	.	.	.	.	20 grains
Essence of peppermint	.	.	.	.	10 minims
Infusion of senna to	.	.	.	.	2 ounces

If the operation is of an urgent nature and there has been no time to give the aperient as described, an enema should be given, if possible, four hours before the operation.

Bladder.—*Operations on the Vulva, Vagina, Cervix.*—The patient is directed to pass her urine just before she is taken into the operating room.

Abdominal Operations.—In abdominal operations it is most important that the catheter should be passed *just before the operation*, since if the bladder is not empty there is danger of the operator cutting into it owing to its distended condition ; moreover, the full bladder will obscure the field of operation.

In some cases a fibroid or ovarian tumour will so press on the urethra that the nurse may have great difficulty in passing the catheter, which shall be of rubber and not of glass, and, if so, she should always inform the operator of her difficulty, since it often transpires that she has been unable to empty the bladder.

In the radical operation for carcinoma of the cervix, the surgeon will probably pack the vagina with gauze soaked in

some antiseptic solution after the patient is anæsthetized. In this case the bladder can be catheterized just before the packing is inserted.

Dress.—The patient should be dressed in a clean night-gown and flannel dressing-jacket; she should have long woollen stockings reaching well up the thighs, and in addition, if possible, a jacket of gamgee tissue well covering the chest and which can be made by the nurse beforehand. Her hair should be done up in two plaits, and if she has any false teeth these should be removed before she is placed on the operating table.

Food.—If the operation is to be at 9 a.m., at 5 a.m. the patient is given a cup of tea and a rusk and butter. If the operation is to be at 2 p.m., then the tea and food is given at 10 a.m. The condition of the patient will be the guide as to how she should be fed prior to the operation, whether, for instance, on account of weakness, stimulants and extra feeding will be necessary.

CHAPTER XXII.

THE ASEPTIC TECHNIQUE.

THE technique of aseptic surgery is based upon the principle of preventing the infection of wounds by bacteria. The word aseptic means freedom from septic bacteria and their spores.

Such a technique can be perfect only if the case is a clean one, that is, if the operation area is not already infected and if everything that comes into contact with the wounded surfaces is sterile.

In a clean case, however, and with due care, the aseptic technique can be carried out in its entirety, with the exception of the sterilization of the skin. It is most difficult to sterilize the skin, and although, as a matter of fact, if the skin of the operation area is properly prepared the danger of wound infection from this source will be very slight, nevertheless it must be admitted that it may be impossible to destroy all the bacteria which may have got into the sebaceous or fat glands of the skin without using chemical antiseptics of such a strength that the tissues would be injured.

The aseptic technique will be discussed under the following headings :—

In Hospital,
In a Private House.

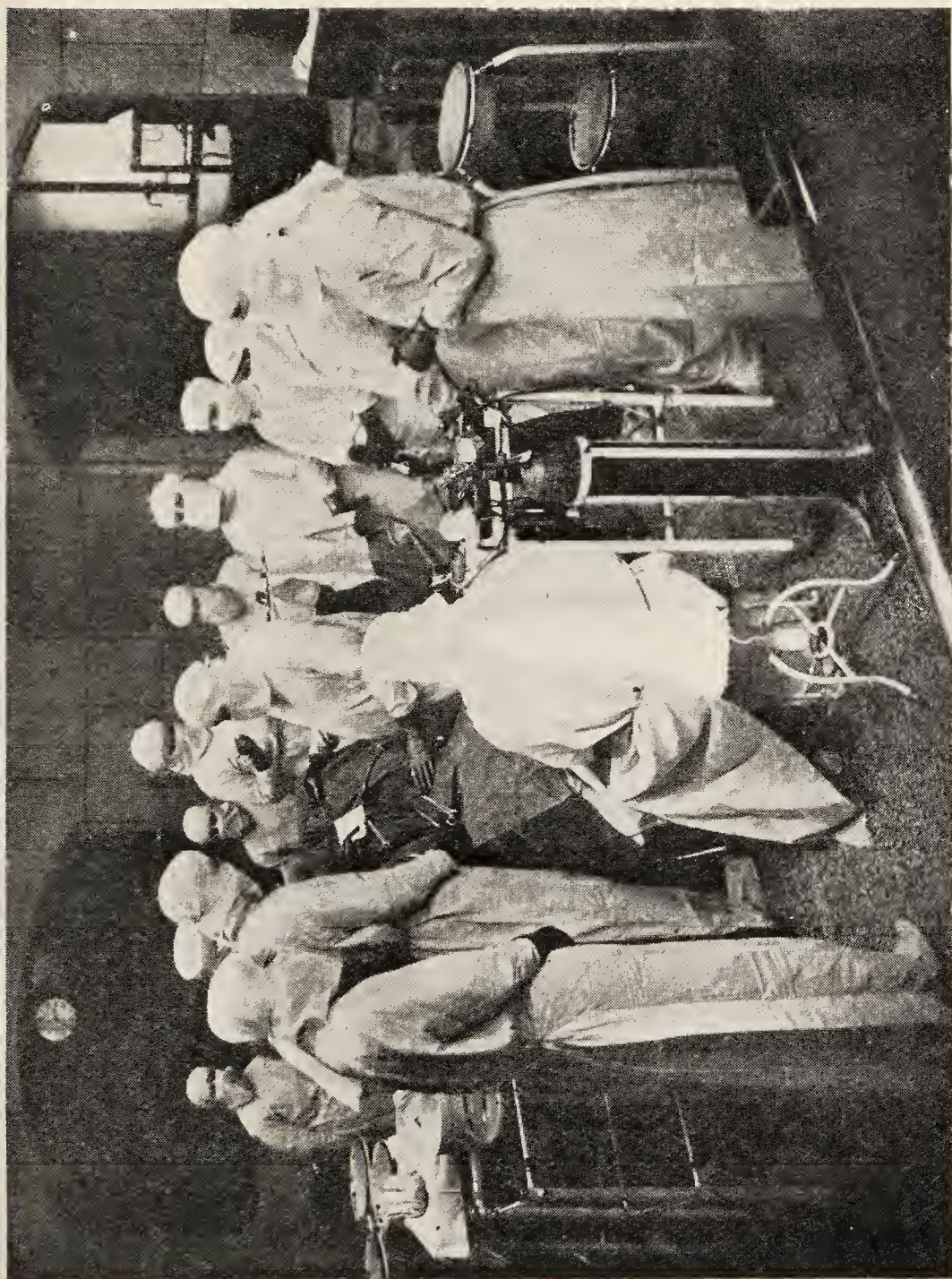
ASEPTIC TECHNIQUE FOR OPERATIONS IN HOSPITAL.

The directions and rules given under this heading are, in the main, those followed at the Middlesex Hospital.



[Copyright, Wellcome Historical Medical Museum.]

FIG. 47.—A SURGEON'S OPERATING ROOM, 1690.



[Copyright, Wellcome Historical Medical Museum.]

FIG. 48.—A MODERN OPERATING THEATRE.

Surgeon, house surgeon, anaesthetist, dressers, theatre sister, ward sister, theatre nurse.

The following subjects will be considered :—

1. The operating theatre and its furniture.
2. The preparation of instruments, ligatures, rubber gloves, sutures, saline solution, swabs, dabs, and dressings.
3. The preparation of the hands of the nurses.
4. The clothing of the theatre and ward sisters and of the theatre nurse.
5. The duties of the theatre sister.
6. The duties of the theatre nurse.
7. The duties of the ward sister.
8. Surgically cleaning the patient's skin, and preparation of the operation site.

THE OPERATING THEATRE AND ITS FURNITURE.

1. The theatre floor is scrubbed, and the furniture is carbolised with a solution of 1 in 20 carbolic acid before operations.

2. The electric light fittings are kept as free from dust as possible, and the shades of the lights over the operating table are washed daily.

3. The doors of the theatre and anæsthetizing rooms are kept closed during the operations.

4. The sinks and wash-basins, both inside and out, and the walls behind them are cleaned every day.

5. The waste-pipes in connexion with the sinks and basins are cleaned with a brush.

6. The theatre walls are swept down every day, and every six weeks the whole surface of the walls is washed by the hospital porters.

7. The instrument and bowl sterilizers are washed every day with soda and water.

8. The articles of furniture used for the operation are :—

An operating table.

An instrument table.

A swab or dab table.

One or two dressing tables.

Two bowls or tripods for hand lotions.

A surgeon's stool, if necessary.

An anæsthetist's table.

An anæsthetist's stool.

9. The position in which such furniture is placed varies with the choice of the individual surgeon.

A reference to Figs. 68 and 69 shows the positions used by the author for major and minor operations respectively.

10. The theatre floor in the neighbourhood of the operating table, and also any tables or tripods, if they have been soiled, are swabbed down between each operation.

Preparation of the Instruments, Ligatures, Sutures, Rubber Gloves, Saline Solution, Swabs, Dabs, and Dressings.

Instruments.—

1. All instruments to be used, except the needles, knives, and scissors, are boiled twenty minutes before each operation, a pinch of bicarbonate of soda being added to the water. The lid of the sterilizer is kept closed while the instruments are being boiled.

2. The needles, knives, and scissors are placed in pure lysol and rinsed in methylated spirit before being used.

3. The same knife is never used for more than one case, after which it is boiled for three minutes and sent away to be re-sharpened. The scissors and needles are replaced in pure lysol and rinsed in methylated spirit after use. The needles are sterilized by being placed in pure lysol and are afterwards rinsed in methylated spirit.

4. All instruments are thoroughly cleaned with cold water and a nail-brush after use and before they are again boiled. Special care is paid to all the serrations and locks. The flushing curette is sluiced by holding the hole in its handle under fast cold running water from the tap, after this it is boiled and some Rangoon oil is lastly run through it to prevent rusting.

5. All porringers, dishes, and receivers are sterilized by

boiling, after which they are placed on a table and covered with sterilized towels.

6. The nail-brushes used by the surgeons, students, and nurses are boiled daily, and placed before use in a bowl of weak lysol solution.

7. All instruments, except the needles, knives, and scissors, that have been used during the twenty-four hours are boiled for twenty minutes, in addition to the twenty minutes they have been boiled for the operation in which they were used.

8. Rubber tubing is boiled for ten minutes and afterwards kept in a solution of 1 in 60 carbolic acid. When required, the tubing is removed direct from the glass-stoppered jar with a pair of sterilized forceps. Any portion that is not used, is boiled for ten minutes before it is returned to the jar.

Ligatures and Sutures.—

1. The silk or thread is boiled for an hour and is used fresh for each case.

2. Silkworm gut is boiled for ten minutes and then kept in a solution of 1 in 20 carbolic acid.

3. Catgut already prepared and put up in sealed glass tubes is used. The tubes are covered with wool and then completely immersed in a bowl of 1 in 1000 perchloride of mercury for thirty minutes before use.

Rubber Gloves.—

1. The gloves are either sterilized by the high-pressure sterilizer or boiled for twenty minutes and, if the latter, are then placed in whatever lotion the surgeon directs.

2. After their removal the gloves are well soaked in cold water and then washed inside and out with soap and water and are examined for punctures.

3. After being washed the gloves are boiled for seven minutes, then well dried and powdered with talcum powder.

CAUTION.

Rubber gloves are worn to protect the patient and not the nurse.

All punctures should, therefore, be mended, or failing this, the gloves should be discarded.

Normal Saline.—

1. Concentrated saline solution is kept in a stoppered Winchester quart, and is of such a strength that 1 ounce of the solution to a pint of water makes a normal saline solution

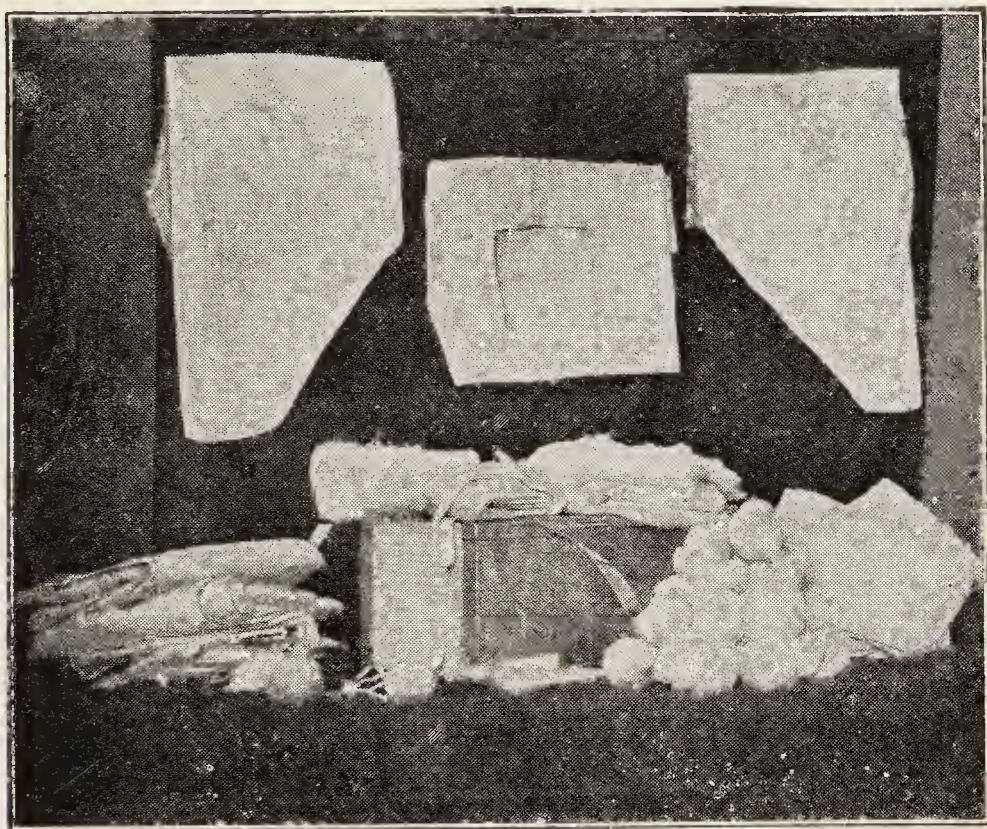


FIG. 49.—MINOR OPERATING TIN OF STERILIZED DABS, DRESSINGS, AND CLOTHING AS PUT UP FOR THE AUTHOR BY MESSRS. BELL & CROYDEN.

Showing leggings, perineal cover, overalls, masks, towels, dabs, tampons, T bandage, dressings.

2. Each day a certain amount of normal saline solution is prepared and is then boiled for twenty minutes and stored in sterilized bottles.

3. The normal saline solution, when required, is poured straight into a sterilized porringer or jug, as the case may be. At the end of the day if any of the solution is left in

the bottle it is added to the next day's supply and boiled with it.

Dabs.—

These are made of absorbent cotton-wool wrung out of a solution of perchloride of mercury (1 in 2000). Dabs will be needed for minor operations upon the vulva, vagina, and cervix. The number required will depend rather on the nature of the operation. Three dozen will probably be sufficient for any case, and if any are left over they can be used later when dressing the patient. Some surgeons prefer pieces of gauze folded in four about six inches square. In many cases such dabs are more convenient to use but their cost is much greater.

Dabs, especially when used in the form of gauze, are a heavy item of expenditure in hospital finance. This expense can be greatly reduced, and the efficiency of the dab increased, by using Turkish towelling cut to the same size as the gauze dabs, and properly hemmed. Such dabs can be used over and over again, being sent to the wash and sterilized on their return. The same material can be used for the smaller swabs.

Swabs.—

For abdominal and vaginal sections the swabs are made as follows:—

Some gamgee tissue is cut into square pieces, after which their edges are tucked in and sewn. Two sizes should be made, 12×12 inches and 6×6 inches. As a rule 12 swabs will be quite sufficient for most operations, two 12×12 inches and ten 6×6 inches. In many cases not half this number will be used. The squares are sewn together like a mattress. They are sterilized in the high-pressure sterilizer. Some surgeons use squares of muslin only, in which case there must be eight layers sewn together in a similar way to those made of gamgee.

As gamgee is expensive, swabs serving the same purpose can be made by enclosing a layer of absorbent wool between muslin.

Dressings.—

Perineorrhaphy and Colporrhaphy.—A piece of sterilized gauze is inserted into the vagina to act as a drain; this is removed the morning following the operation; another piece is placed over the stitches, and this is kept in place by a pad of absorbent wool and T bandage.



FIG. 50.—MAJOR OPERATING TIN OF STERILIZED SWABS, DRESSINGS, AND CLOTHING AS PUT UP FOR THE AUTHOR BY MESSRS. BELL & CROYDEN.

Showing 10 small swabs, 2 large swabs, overalls, masks, body cover, towels, dressings, many-tailed bandage.

Excision of Bartholin's Cyst, Cancer of Vulva.—A piece of cyanide or plain sterilized gauze is placed over the parts, and then a pad of absorbent wool, which is kept in place by a T bandage.

Curettage.—A gauze drain is inserted into the vagina, and in some cases the operator may wish, in addition, if there is

undue bleeding, to pack the uterus with gauze. In this case he will require the gauze, which should be ready and suitably protected, to be handed to him in a long, continuous strip about 2 inches broad. Some surgeons prefer not to insert any dressing into the vagina. A pad of absorbent wool and a T bandage then completes the dressing.

Excision of Vaginal Cyst or Tumours.—Unless there is any troublesome oozing (when the vagina can be packed for a few hours with gauze or tampons), a pad of absorbent cotton-wool and T bandage is all that will be necessary.

Operations on the Cervix.—As for operations on the vagina.

Vaginal Hysterectomy.—As a rule, most surgeons insert a small quantity of sterilized gauze, which acts as a drain, through an opening at the top of the vagina into the pouch of Douglas.

Abdominal Section.—The wound is dressed with dry dressing, consisting of gauze, absorbent wool, and a many-tailed binder. Rarely, consequent on some oozing of blood or escape of pus, the operator may wish to drain the pelvis, in which case he will require a drainage tube. A safety-pin which has been boiled will be required to prevent the drainage tube slipping into the abdominal cavity.

The patient should be measured for the binder prior to the day of the operation, in order that it may fit nicely. The author has not for many years used any dressing or binders after abdominal operations, unless the pelvis has been drained. The wound of the abdominal incision heals just as well without any dressing, and patients who have had two abdominal operations, and for the first had dressings and the second none, assert that they are more comfortable without any dressing. This method results in the saving of great expense to a hospital in which a large number of abdominal operations are performed during the year.

If the patient is very sick following the operation it is advisable to adjust some sort of abdominal binder till the attack is over.

Preparation of the Hands of the Nurse.

Before helping in any way with the operation or in preparing the instruments, the hands should be thoroughly washed for a period of three minutes in running water.

The hands and forearms are scrubbed with a sterilized nail-brush and soap and water until a good lather is obtained, particular care being given to the nails and clefts between the fingers. When a good lather is obtained, the washing is continued with plenty of soap and hot running water.

If gloves are going to be worn the soap is removed with the running water and the gloves are then applied as directed. If, as in the case of the theatre nurse, gloves are not being worn, the hands are dried on a sterilized towel, which should not be used again for a similar purpose.

CAUTION.

1. All nurses working in the theatre should be quite healthy. Such conditions as carious teeth, sore throats or septic wounds of the fingers are especially dangerous.

2. Rough skin harbours microbes to a much greater extent than smooth skin. It is possible to keep the hands smooth by not dipping them into too strong an antiseptic solution or by avoiding those antiseptics which experience proves do not agree with the skin of the particular person concerned. In addition, after the nurse has finished her work and her hands have been well dried, a little diluted glycerine should be rubbed into them.

3. The nails should never be cleaned by scraping them with a knife, nail-cleaner, or pair of scissors. They should be kept short enough to allow of their being effectively cleaned with the nail-brush.

4. Pus should not be touched with the bare fingers, and dirty dressings should be removed with dressing forceps.

5. All rings should be removed, even if one happens to be a wedding ring. Hospital nurses do not, as a rule, wear rings when on duty, but private nurses have been known to do so.

Clothing of the Theatre Sister, Ward Sister, and Theatre Nurse.

Overalls, Veils, and Footwear.—

1. The theatre and ward sisters and theatre nurse wear clean linen dresses, the sleeves of which can be rolled up above the elbows.

2. The theatre and ward sisters and theatre nurse wear sterilized overalls, and veils also if the surgeon elects to wear one. Other nurses on duty in the theatre wear sterilized overalls and some pattern of head-dress.

3. The overalls are, before being sterilized, so folded that the surface which will be in contact with the body is outermost.

4. After the overall has been taken from the tin by the person who is going to wear it, it is held so that it becomes unfolded and the arms are then slipped into the sleeves and held out straight in front.

5. The theatre nurse adjusts the overall of the theatre and ward sisters by pulling it into place by means of its tapes which are then tied. The clothes at the back should be completely covered. She also adjusts the veil, which should cover the nose.

6. Some surgeons require nurses to wear overalls, made of calico or some other material, over their shoes and reaching up their legs to their knees, where they are tied with a tape.

7. In some hospitals the theatre nursing staff wear india-rubber boots.

Rubber Gloves.—

1. To put on a rubber glove that has been boiled it should first be emptied of the boiling water that remains in it after removal from the sterilizer, otherwise the hands may be badly scalded. It should then be filled with the lotion in which it was placed, and held with the fingers pointing downward and away from the bowl of lotion, over a dish or another bowl.

2. The hand corresponding to the glove should now be passed into the glove and, as it displaces the lotion, the hand should be raised and the lotion allowed to escape into the sink or bowl and not over the glove.

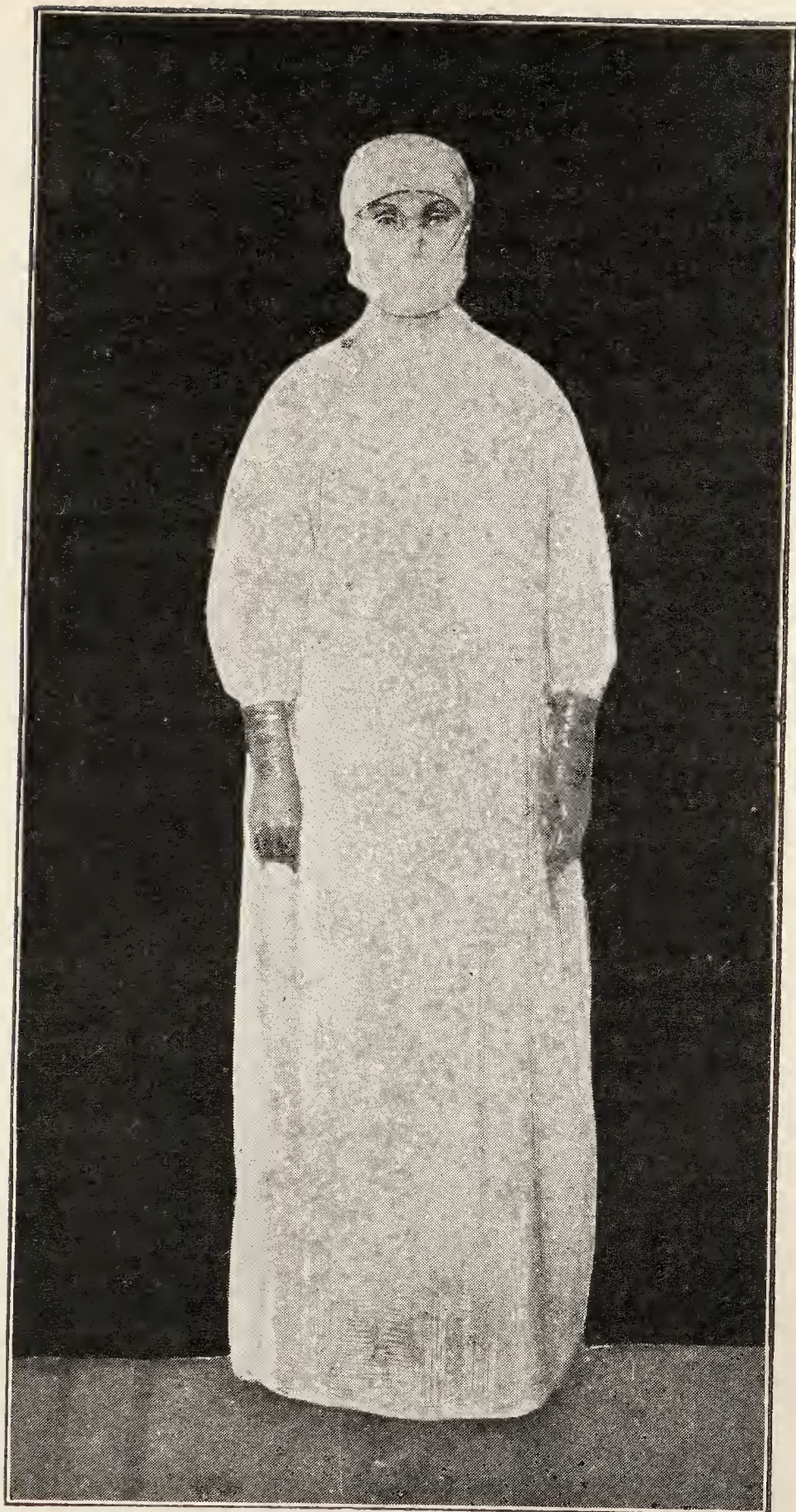


FIG. 51.—NURSE PROPERLY CLOTHED FOR ASSISTING AT AN OPERATION.

See that the veil covers the nose and that the ends of the sleeves of the overall are covered by the cuffs of the rubber gloves.

3. The cuff of the glove should then be pulled over the cuff of the overall so that the hand, wrist, and arm are covered entirely with sterilized articles (Fig. 51).

4. After the operation the gloves should be well washed with cold water before they are removed.

5. A rubber glove is best removed by raising the cuff of the glove, allowing a little water to enter, and then pulling on the cuff so that the glove is turned inside out. There is much less risk of tearing the glove by this method, than that so often employed by nurses of pulling off the glove in its soiled state.

Many surgeons require methylated spirit, or a solution of biniodide of mercury and spirit, to dehydrate their hands before putting on the gloves.

If rubber gloves sterilized by the dry method are being used, the hands should be dried with a sterilized towel first, after which they should be powdered with sterilized boric acid applied with a piece of sterilized gauze.

Dry sterilization destroys india-rubber gloves much more quickly than boiling them.

CAUTION.

Do not try to eradicate any creases in the fingers of the glove which has been drawn on, by smoothing them out with the bare fingers of the other hand, as by doing so the glove may be infected.

With a little practice the gloves can be drawn on quite easily without causing any creases. If the latter are present, they must be smoothed out by the gloved fingers of the other hand, or if the tips of the glove fingers are projecting in a collapsed condition beyond the fingers of the hand, the glove should be removed and reapplied. Some nurses and also doctors appear to have an insuperable difficulty in putting on the rubber gloves by the method described. If such is the case an alternative method is to smear a little ether soap over the hands first.

The Duties of the Theatre Sister.

1. The nature of the instruments to be used and their number should be most carefully noted, and it is better to

make a list for each operation. Such information is necessary because at the end of the operation the surgeon will ask whether the instruments are correct.

To avoid the necessity of another instrument having to be fetched while the operation is in progress, the sister should, if she does not know for certain, ascertain from the surgeon or house surgeon what instruments will be required.

2. Having prepared her hands, and put on her overall, veil, and gloves, she should, during the operation, touch only those articles which have been sterilized.

3. She should cover the instrument table with a sterilized towel.

4. The instruments, sutures, and ligatures having been transferred from the sterilizer by the theatre nurse, the theatre nurse should arrange them in the operating tray, or on the instrument table, according to the wishes of the surgeon, and should then cover them with a sterile towel.

5. All sutures and ligatures should, while being cut, be touched, as far as possible, with sterilized forceps only and should be covered with a sterilized towel during the operation. When the catgut is required, the theatre sister should remove the tube from the antiseptic with a sterilized towel and break the tube in this.

6. Unless otherwise directed the average length for a ligature is 18 inches, for a mattress suture 12 inches, and for a continuous suture 24 inches.

7. If there is more than one operation the theatre sister should assemble the instruments for the next operation before the previous one is commenced, or, if it is the duty of the theatre nurse to do this, the theatre sister should check the instruments and their number. By doing so, the instruments for the next operation can be sterilized during the progress of the one about to be performed.

8. At the termination of one operation the theatre sister should remove her gloves, wash her hands, and assemble the instruments for another operation if necessary, as noted in paragraph 7. She should then wash her hands again,

and put on a fresh sterilized overall and a pair of sterilized gloves, preparatory to arranging the sterilized instruments for the next operation. If the overall has not been soiled, as an alternative to putting on a fresh sterilized overall a pair of loose sterilized sleeves can be drawn over the sleeves

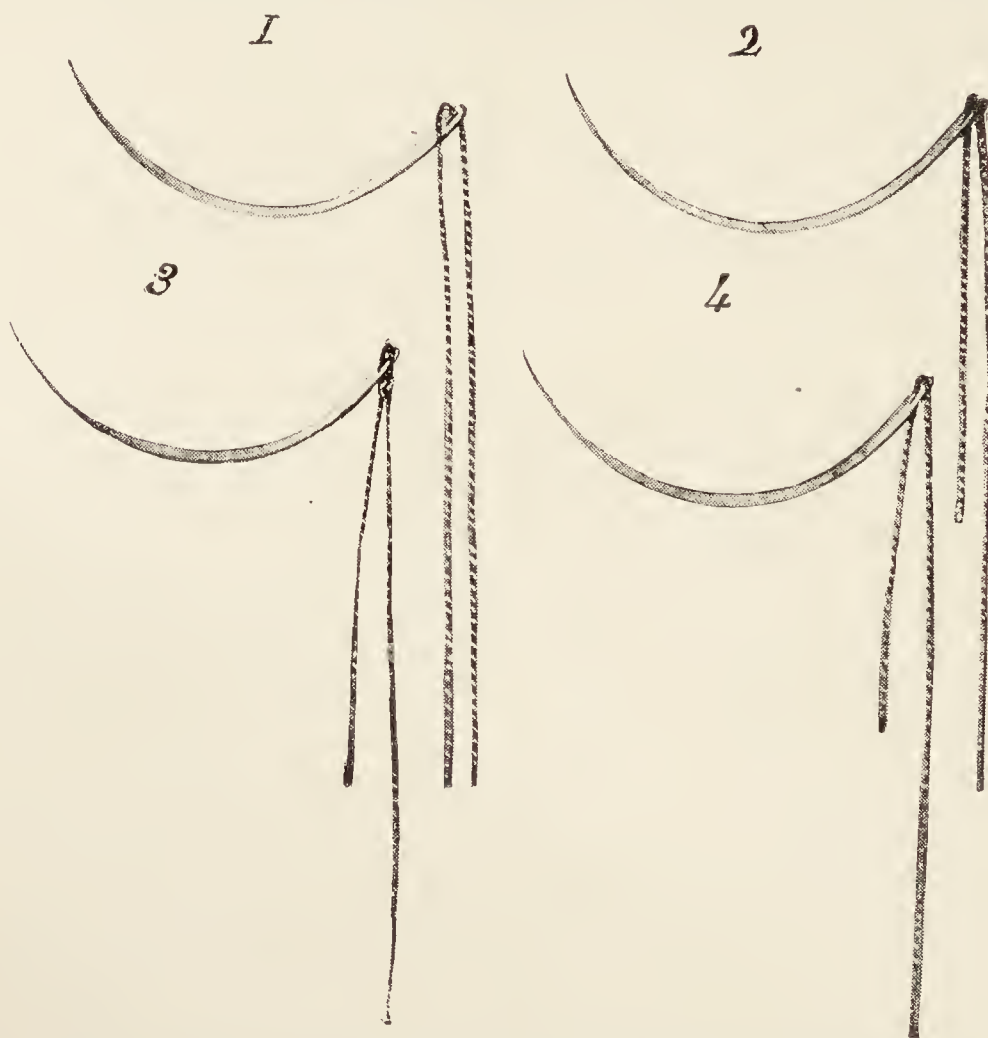


FIG. 52.—CORRECT AND INCORRECT METHODS OF THREADING THE NEEDLE WITH MATTRESS AND CONTINUOUS SUTURES.

Mattress Suture :—

1. Incorrect, both ends the same length.
2. Correct, one end longer than the other.

Continuous Suture :—

3. Correct, tied in with one knot.
4. Incorrect, not tied in.

of the overall. The object of this is to save a multiplicity of overalls and to reduce the cost of the washing.

CAUTION.

The theatre sister should never fetch any new instrument herself but should direct the theatre nurse to do so.

If a tray is used for the ligatures and sutures, care should be taken when cutting them off not to let them touch the edge of the tray. If a tray is not used, they must not be allowed to touch the edge of the table. Ligatures and sutures should be handed straight to the operator without allowing them to touch anything but sterilized instruments or gloves.

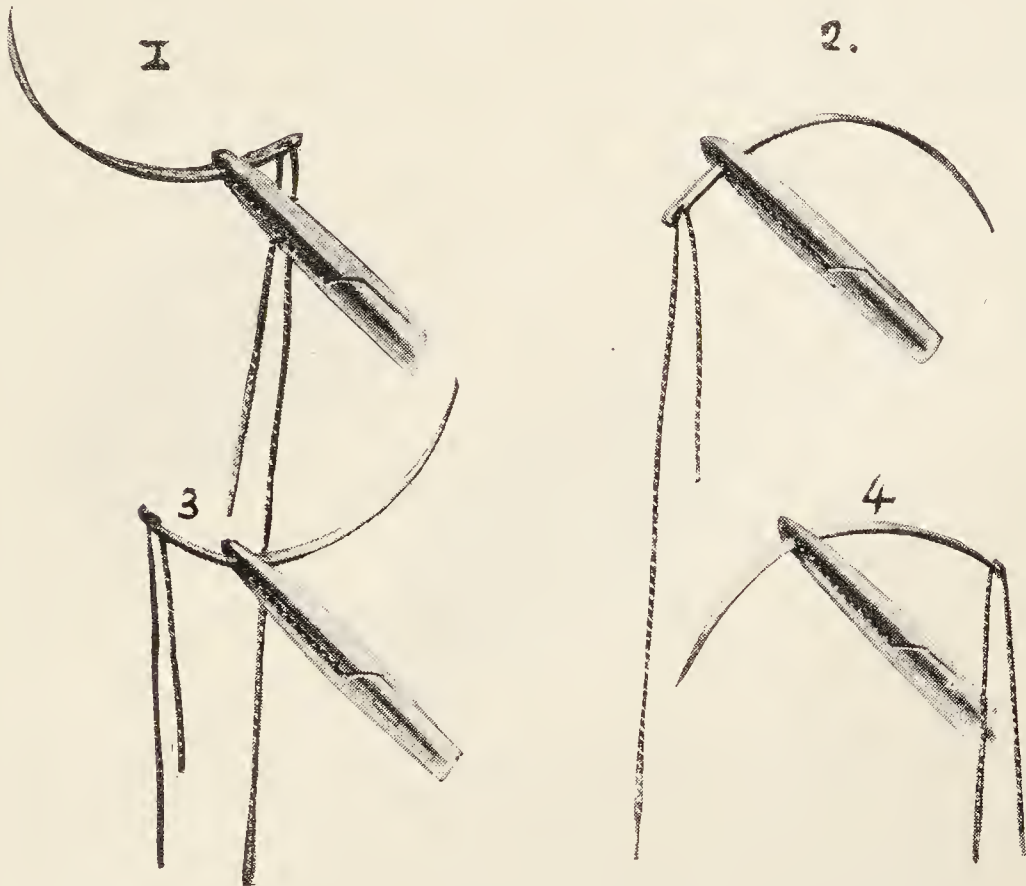


FIG. 53.—CORRECT AND INCORRECT METHODS OF FIXING A THREADED NEEDLE IN A NEEDLE-HOLDER OR PRESSURE FORCEPS.
1. Correct—the sharp point of the needle pointing upwards and towards the surgeon.
2, 3, and 4. Incorrect.

Sutures or ligatures must never be drawn through the fingers to straighten them or to estimate their length, as this increases their chance of being infected. If they happen to be curled, they should be straightened by pulling on each end.

A mattress suture should not be tied in the needle, and

one end should be left longer than the other when the needle is threaded. Fig. 52 (1 and 2).

A continuous suture should always be tied in the needle with one knot, leaving one end short, about 2 inches. Fig. 52 (3 and 4).

There is a right way and a wrong way of fixing a threaded needle in a needle-holder or pressure forceps (Fig. 53), and of handing it to the operator (Fig. 54). The surgeon prefers the right way, and yet in spite of their training a large number of nurses, especially when acting



FIG. 54.—CORRECT METHOD OF HANDING THREADED NEEDLE TO THE SURGEON.

1. In pressure forceps, so that the surgeon can take hold of the end of the forceps.
2. With the fingers, so that the surgeon can grasp the needle with the pressure forceps.

as instrument nurse at operations outside the precincts of a hospital, will insist on threading the sutures and handing the needles to the surgeon incorrectly. This shows great lack of observation even if not carelessness.

If the number of instruments used has not been carefully noted a wrong answer may be given to the surgeon when he inquires if the number is correct, with the result that the instrument may be left in the abdomen.

Those surgeons who use slot needles (Reverdin's or some

modification thereof) will not require the ordinary needles or the theatre sister to thread the needle. In this case as regards the sutures all the theatre sister has to do is to hand the correct length of suture to the house surgeon or assistant. The correct position for the theatre sister is then at the bottom of the operating table opposite the knees of the patient when she will be able easily to pass over the suture. In this case she will find it more convenient to stand on a platform and have an instrument table that can be raised to a comfortable height. In the absence of such a platform and table she must place her instrument table on the right-hand side of the house surgeon. In addition she will find it convenient, and add to the perfection of the operation technique, if she cuts the sutures and ligatures the desired length before sterilizing them, keeping them thereafter in a sterilized towel, or better still, threading them through a glass tube first and then sterilizing this.

Lastly some surgeons use wristlets for their sutures and ligatures, in which case beyond preparing them and their receptacles, the theatre sister will have no further duties in respect of these.

The Duties of the Theatre Nurse.

In many large hospitals there are two theatre nurses, in which case the duties, as here outlined, will be divided.

The theatre nurse helps the theatre and ward sisters during the operation in any way they require and thus prevents them infecting their gloved hands.

In addition:—

1. She should arrange the necessary furniture in its proper position.

2. She should prepare the lotion for the hands, being careful that its strength is correct, and its temperature not too high.

3. She should wheel the instrument table, the top of which is covered with a sterilized towel, by its legs, to the sterilizer. She should then with a pair of forceps, previously sterilized and kept in a sterilized or antiseptic

solution, remove the instruments, etc., from the sterilizer, into the instrument tray or on to the instrument table, as the case may be.

Alternatively the theatre sister can thus transfer the instruments, or the instrument table being placed in the

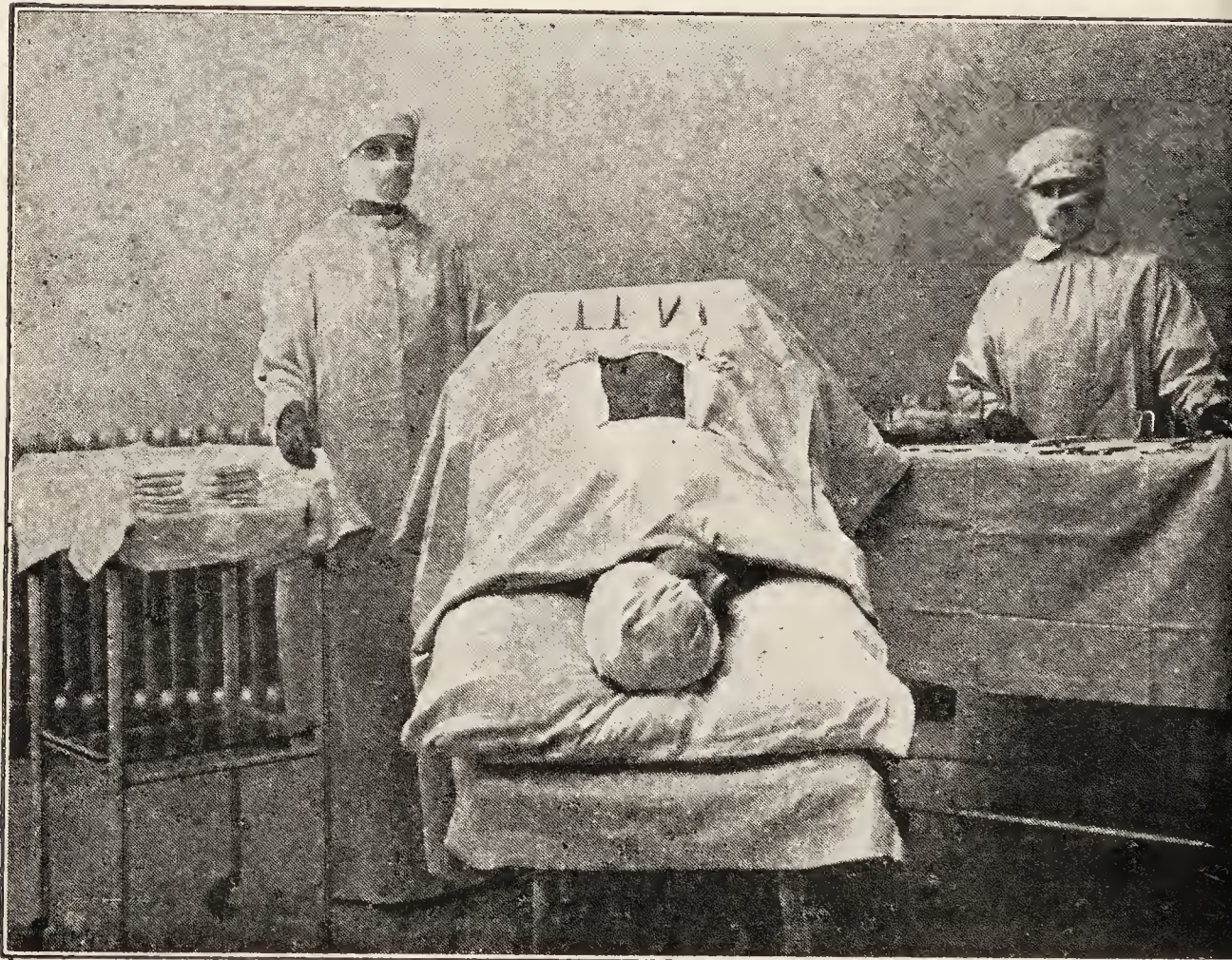


FIG. 55.—TRENDLENBURG POSITION.

Showing the theatre sister and ward sister and the instrument table and swab table in their proper positions. The patient is tilted into the Trendelenburg position and the sterilized body cover and knee table is in place.

position it will occupy during the operation, the theatre nurse can lift the wire tray from the sterilizer, carry it to the instrument table, and turn out the instruments on to it.

4. When the patient has been lifted on to the operating table, the theatre nurse should place her in position as follows: The night-gown is drawn up to a level with the chest and the blanket well below the pubes. The arms of the patient are then securely fixed by her side as follows,

either by the special arm holder of Patterson, which is the best way, or by arranging the arms of the patient straight along her sides under the macintosh, the palms of her hands in apposition with the table and slightly beneath her buttocks.

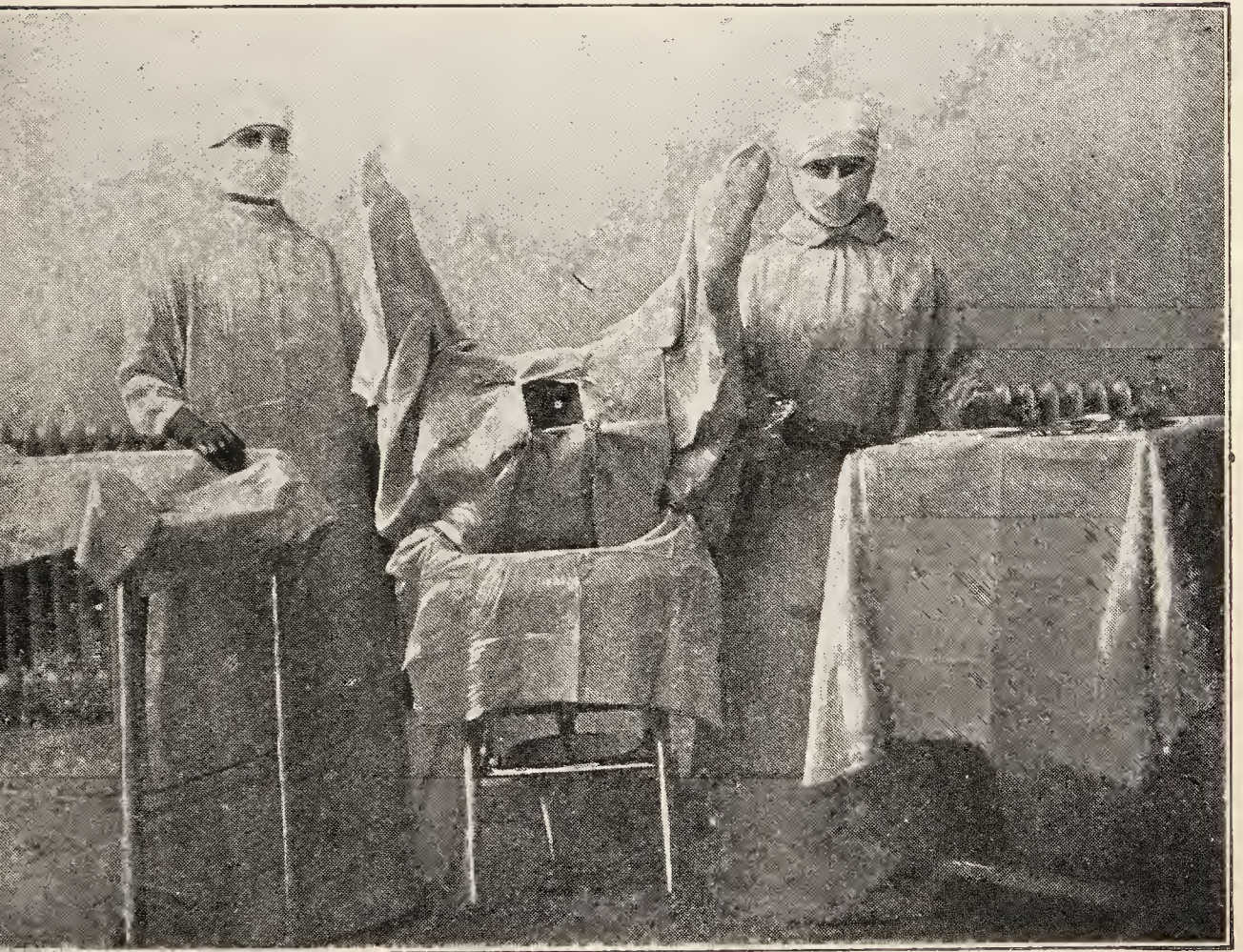


FIG. 56.—LITHOTOMY POSITION.

Showing the theatre sister and ward sister and the instrument table and swab table in their proper positions. The patient is in the lithotomy position with the buttocks well over the end of the table and projecting over the tray. The sterilized leggings, perineal cover, and towel over tray are in place.

Trendelenburg Position.—

If the surgeon wishes the patient to be placed in the Trendelenburg position before the anæsthetist tilts the table, the legs or ankles must be securely fixed with straps or bandages to the flap of the table which is at the end and

projecting at right angles to the rest of the table (see page 259).

After the patient is tilted to the correct angle the theatre nurse should adjust the knee-instrument table devised by Victor Bonney, should the surgeon elect to use it.

Lithotomy Position.—

The best way to bring the patient into the lithotomy position is for the theatre nurse to stand at the bottom of the table, and then, with one hand under each buttock of the patient, to drag her down so that the patient's buttocks project well over the end of the table. The anæsthetist, or his clerk, can render valuable help by pushing the shoulders of the patient at the same time.

5. She should then, if the surgeon wishes it, paint the skin of the operation site with the iodine solution.

6. She should next open the tin containing the sterilized body-cover and towels, if the operation is an abdominal one; or the sterilized leggings, the perineal cover and towels if the operation requires a lithotomy position, so that the theatre sister can gain access to these articles without infecting her hands with the outside of the tin.

7. If during the operation a new instrument is required, she should take it from the instrument case, sterilize it, and then hand it with sterilized forceps, or in the wire tray of the sterilizer, to the theatre sister.

8. If during the operation the surgeon requires a porringer or normal saline solution, she should take one of the porringers or jugs already sterilized and hand it in a sterilized towel. A small porringer or jug should always be carried by placing the hand outside and then separating the fingers and thumb, and not with the help of the thumb inside the article and the hand and fingers outside.

9. She should not touch anything that has been sterilized, unless so directed, without holding it in a pair of sterilized forceps or in a sterilized towel.

10. At the close of the operation she should hand the tin of sterilized dressings to the surgeon, house-surgeon,

or theatre sister as the case may be, having first opened the lid.

11. If the instruments which have already been used are required again during the afternoon for another operation, she should clean them.

12. She should have the necessary articles ready for catheterizing the patient during the operation. If the surgeon wishes this to be done, she should be prepared to pass the catheter if requested. Before, therefore, undertaking the post of theatre nurse, she should make herself thoroughly acquainted with the proper method of passing the catheter and of the site of the urethral meatus. Nothing is so exasperating to a surgeon as a nurse bungling in her attempts to empty the bladder during the course of an abdominal operation.

13. At the close of the operation she should arrange the clothes of the patient in a suitable manner, and cover the patient with a blanket prior to her removal from the theatre. She should also place a porringer and towel near the face of the patient in case she vomits.

CAUTION.

If the antiseptic in the lotion for the hands or gloves is too strong or is not mixed properly, the hands of anyone using it may suffer. This is particularly likely to happen if the surgeon uses a lotion containing carbolic acid, which may have been prepared of such a strength that it will anæsthetize his fingers. Also if, when the pure carbolic is added to the water, the solution is not thoroughly mixed, some of the chemical will accumulate at the bottom of the lotion bowl, and when the hands are placed in the lotion they may be badly burnt or blistered, an occurrence which the surgeon is never likely to forget and will certainly not excuse.

If the lotion is made too hot the hands of the surgeon may easily be scalded. The temperature of the lotion should be taken with a thermometer and should be about 100° F. It is notorious that nurses can place their hands,

with impunity, in water at a temperature which would make the surgeon jump if nothing more. In judging the proper temperature of the lotion for the hands, therefore, nurses must not be guided entirely by one which they themselves can tolerate.

The theatre nurse should be very careful not to drop any articles on to the floor. The noise occasioned by the dropping of a bowl or porringer, for instance, is apt to annoy the surgeon considerably and the theatre sister especially.

Instruments or swabs dropped on the floor should not be removed until after the counting, unless the instrument happens to be one which cannot be dispensed with, when it should be re-sterilized.

The Duties of the Ward Sister.

1. The theatre nurse having opened the box containing the sterilized towels and body-cover, or the sterilized towels, leggings, and perineal cover, the ward sister should, with the aid of the house surgeon or dresser, arrange these articles appropriately on the patient.

2. The ward sister having covered the swab table with a sterilized towel, should remove the sterilized swabs or dabs from the tin, which has been handed to her by the theatre nurse with the lid open, and place them on the swab table, counting them very carefully as she does so. Some surgeons prefer the swabs to be taken direct from the tin by the house surgeon or ward sister as required.

She should use a different and newly opened box of sterilized swabs and dressings for each patient.

3. Although the ward sister is not personally responsible for the number of swabs used in a major operation, nevertheless, she should always know exactly how many have been used. If the surgeon, as many surgeons do, always uses the same number of swabs (say two large ones and ten small ones, which are sufficient for any major operation, unless, perhaps, a radical hysterectomy) and the sister is certain of her number in the first instance, there is no

difficulty. If the surgeon has no such custom, then the ward sister will be wise to tie the small swabs up in packets of six before sending them to be sterilized.

At any rate she must know how many swabs have been used, because at the end of the operation the surgeon will ask her, and, although he should count them himself, he may very likely take her word for it.

4. Her further duties during the operation depend upon the wishes of the surgeon. Thus she may be directed to hand the swabs or dabs, to convey ligatures, sutures or instruments to the surgeon, or to help in the operation by holding an instrument or swabbing the wound.

5. At the close of the operation she may be directed to help in applying the dressing and in adjusting any bandages.

6. After the operation she should stay by the patient until the ward nurse, who has brought down the next case, is free to take over this duty.

CAUTION.

Never cut a swab in half. The fact that this has been done may be forgotten and half a swab consequently left in the abdominal cavity.

Always be certain that the correct number of swabs have been returned before the abdominal cavity is closed.

Never allow any swabs to be removed from the operation room before the operation is completed.

When assisting at an abdominal operation do not lean on the table, and during an operation with the patient in the lithotomy position do not lean against the patient, as by so doing the patient is tilted sideways.

Attend to your own duties and do not interfere or engage in conversation with other people unless absolutely necessary.

A chatty sister or nurse is an abomination.

Preparation of the Patient's Skin.—Before any operation the patient should be shaved over the operation area; she should also have a bath, and should have the skin in

the neighbourhood of the operation site suitably prepared. Whether or not she should in addition be given a vaginal douche depends upon the directions of the surgeon. If there is hæmorrhage or a discharge, douches twice daily before and on the morning of the operation will probably be ordered, otherwise if the operation is on the vulva, vagina, or cervix the surgeon may direct that these parts be swabbed with the iodine or violet-green solution.

Shaving.—It is much better that the vulva should be shaved before all operations on the genital organs. It is impossible to sterilize the pubic hair; therefore it is better out of the way. The points to remember in shaving are, first of all, to have a very sharp razor, a blunt razor is much more liable to cut the patient; secondly, to lather well the part for some time, and thirdly, to dip the razor momentarily into boiling water before using it.

Undoubtedly the best kind of razor to use is a safety razor, since with it all the angles and folds can be very closely shaved by the most inexperienced nurse without any danger of cutting the patient.

In some instances, especially when the patient is fat, the nurse will experience great difficulty in properly shaving the necessary area, and in these cases this can be successfully accomplished either by placing a pillow in the hollow of the patient's back so that the pelvis is tilted, or, better still, by making the patient kneel. When the shaving is finished any excess of soap and loose hairs are removed with swabs of absorbent wool, after which the patient has her bath.

Bath.—On the afternoon before the operation the patient should, after being shaved, have a hot bath of about 10 gallons of water, to which some surgeons like added 5 pints of a solution of carbolic acid (1 in 20), and she should well scrub and soap herself all over. The nurse should always ask the doctor whether he wishes this bath to be given, because in some cases, in which she will perhaps be unable to judge, it may be very dangerous for the patient to be moved out of the bed. Thus, in cases of extra-

uterine gestation, when bleeding has taken place internally, or in acute inflammatory conditions of the pelvis the nurse must wash the patient in bed.

Preparation of the Skin.—

The manner and thoroughness with which this is carried out is of the greatest importance, since, if the skin is properly cleansed, not only will stitch abscess, a troublesome condition which often causes more distress and trouble than the original operation, be less common, but that which is of much greater importance, there will be less risk of the operator conveying any septic matter from the skin to the peritoneal cavity, and so infecting the patient with, on occasions, a resulting fatal peritonitis.

The patient having returned from her bath, is put to bed. Her nightdress is rolled up all round to her chest, and the bedclothes covering her are removed with the exception of a blanket which is turned down below the pubes.

As the cleansing of the abdomen will necessitate some exposure, the nurse must see that the temperature of the room is not below 65° F., and that the doors are closed and any windows through which the wind will blow directly on the patient.

The nurse should then continue as follows:—

1. She should turn up the sleeves of her bodice above the elbows.

2. She should collect all the materials she will require on a dressing trolley or table, and remove all clothing from the part to be treated.

3. She should wash her hands thoroughly with soap, hot water, and nail-brush.

4. She should spread sterilized towels round the part to be washed, and then continue as follows:—

5. Rub in ether soap until it is dry in order to obtain its penetrating action on the skin.

6. Scrub the skin gently but thoroughly with sterilized wool and hot sterilized water.

7. Remove the lather with a sterilized swab. Be careful after wiping the outer limits of the cleansed area not to go back over the more central parts.

8. Thoroughly rub the cleansed skin with ether or methylated spirit on a sterile swab, removing any excess with another swab.

9. Spread sterilized lint over the area, seeing that the covering is adequate, and bandage firmly in position.

The area to be painted for an abdominal operation should be included between a line drawn across the body at the level of the epigastrium and one drawn across the thighs below the level of the vulva.

If, however, a body-cover is used an area of 12 inches square will be sufficient in most cases, and this is a consideration when violet-green is used, because of its staining properties.

10. The skin of the operation area may then be painted by one of the following solutions:—

Violet-Green Method.—

For sterilizing the skin, this method has been proved, by bacteriological tests, to be the most efficacious of any; the skin being sterile after treatment, whereas it is not with the iodine method. This method owes its superiority to the fact that the dye penetrates the superficial layers of skin and into the fat and sebaceous glands and hair-follicles, situations in which organisms are so commonly found, much more readily than iodine used in such a strength and for such a time that the skin will not be injured.

The solution contains 1 per cent. of a mixture of equal parts of hexa- or penta-methyl violet and sulphate of zinc-free brilliant green, dissolved in equal parts of rectified spirit and water, the powder being dissolved in the spirit before the water is added. Six hours before the operation the solution is painted over the skin of the operation area four times, and a compress of lint soaked in the same solution diluted with an equal quantity of sterile water and covered by a piece of waterproof batiste is then applied

and kept in position by a binder. For operations on the vulva and vagina the solution for painting the vulval surfaces is used half strength before applying the compress, since irritation is caused in many cases when the full strength is used.

If the vagina has to be packed the solution is used half strength, and the packing is inserted just before the operation when the patient is under the anæsthetic.

The disadvantage of the violet-green method is that it stains any linen brought into contact with the dye, and the stain cannot be removed without somewhat affecting the fabric. The nurse should wear india-rubber gloves, the patient an old night-gown, and the painted area must be so protected that the bed linen is not stained. The dye can be removed from the skin by a solution of 1 per cent. hydrochloric acid in rectified spirit.

Iodine Method,—

This method depends partly upon the power which alcohol possesses of penetrating the deeper portions of the skin. Skin that has recently been wet does not allow this penetration to take place to the same degree that obtains when the skin has previously been kept dry for some hours. If possible three or four hours should elapse between the patient's bath and the application of the iodine solution. The solution commonly employed is one of 2 per cent. iodine in rectified spirit. Two applications are required, one in the morning of the operation, and a second in the theatre; the solution should be fresh.

The nurse should—

Rub the part over three times with a clean swab soaked in ether. Apply the iodine with a sterile swab soaked in the iodine solution. Cover the part with dressing or a sterilized towel and keep this in position with a bandage.

In the theatre the dressing is removed and the theatre nurse should again apply the solution, unless the surgeon or house surgeon elects to do so.

Occasionally iodine causes much irritation of the skin and so annoyance to the patient.

Picric Acid Method.—

Some surgeons prefer a solution of picric acid, in which case it is used in the same way as indicated under the iodine method.

CHAPTER XXIII.

SURGICAL INSTRUMENTS THAT WILL PROBABLY BE REQUIRED FOR THE VARIOUS GYNÆCOLOGICAL OPERATIONS.

THE illustrations depicted in this chapter show, and the lists accompanying them enumerate, the surgical instruments that may be required for the performance of the various gynæcological operations. The nurse who is responsible for the instruments, sutures and ligatures, must be guided by the special requirements of each individual surgeon. If, therefore, she does not know which particular instruments or what variety of ligatures and sutures the surgeon is in the habit of using for any special operation, the nurse must ask him.

It is much better, in case of doubt, to prepare too many instruments than too few. The absence of some instrument which is required means a delay in the operation while it is taken from the instrument case and sterilized.

On the other hand, there is a distinct disadvantage in putting too many instruments out, since the chance of one of them getting mislaid is greater. There are many cases on record, and a vast number not on record, in which some instrument, such as a pair of dissecting or pressure forceps, a pair of scissors or a towel clip has been inadvertently left in the abdomen. Such an instrument has been recovered later, either at a post-mortem examination; by its discharge through an abscess; by the operator having to re-open the abdomen, the fact that the instrument was missing being discovered only after he had closed it, or by X-ray examination of the patient. The nurse must be very

careful, therefore, to count the instruments before the operation and at the close, just before the peritoneum is sutured, so that she may be able to answer the question "Are the instruments correct?"

If any doubt arises after the patient has left the operating theatre, and if the necessary apparatus is available, an X-ray examination of the abdomen will settle the matter.

For sutures and ligatures the author uses plaited silk and iodine tanned 30-day catgut, put up in hermetically sealed glass tubes.

It is found by experience that 20 yards of No. 4 silk and six yards of No. 2 silk are, as a rule, more than sufficient for any major operation of a gynæcological nature.

Rubber gloves will be required for the surgeon, house surgeon and dressers, the instrument sister, and ward sister.

For the meaning of the names of the various operations the nurse is referred to the Glossary.

Vulval and Vaginal Cysts.

- | | |
|--|---------------------------------|
| A. Clover's crutch. | J. Catheter. |
| B. 6 Short pressure forceps. | K. Scalpel. |
| C. 2 Scissors. | L. Auvard's speculum. |
| D. Vaginal retractor. | M. 2 No. 5 half-circle needles. |
| E, F. 2 Dissecting forceps, long
and short. | N. 2 No. 9 " " " |
| G. 2 Ring forceps. | O. Bladder sound. |
| H. 4 Spring clips. | P. 2 Tubes catgut, No. 2. |
| | Q. Gloves, 4 pairs. |

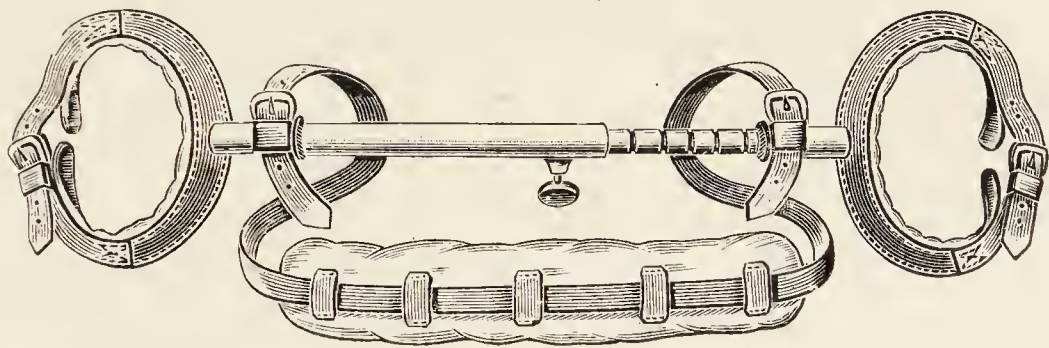
If the cyst is in the posterior wall a vaginal retractor will be required.

The ring forceps are used as swab holders.

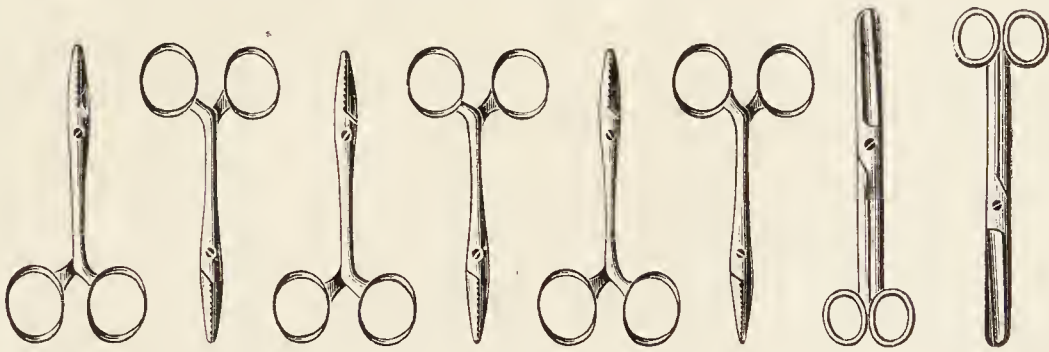
Bartholin's cyst causes discomfort and is apt to get inflamed.

Vaginal cysts may be a cause of dyspareunia or may obstruct the head of any advancing child during labour; they may also become inflamed.

ALLEN & HANBURY'S

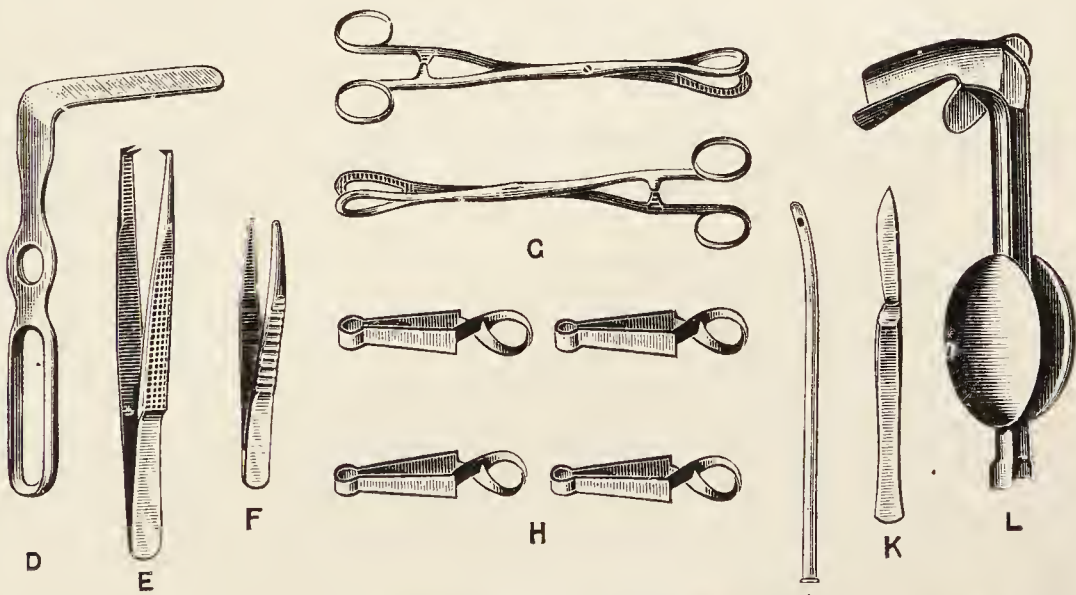


A



B

C



D

E

F

G

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Q

4 PAIRS

FIG. 57.

The Radical Operation for Malignant Disease of the Uterus.

- | | |
|---|---|
| <p>A. 12 Long pressure forceps.
 A'. Scalpel.
 B. 3 Ring forceps.
 B'. Vaginal clamp.
 C. 4 Long angular forceps.
 D, E. 2 Dissecting forceps, long and short.
 F. Probe.
 G. Catheter.
 H. 6 Short pressure forceps.
 J. Self-retaining retractor.
 K, L. Michel's clip apparatus.
 M. 3 Reels silk, Nos. 6, 4, and 2.</p> | <p>N. 4 Spring clips.
 O. 2 Tubes catgut, No. 2.
 P. 4 No. 5 half-circle needles.
 Q. 2 No. 9 " " "
 R. 2 No. 13 " " "
 S. Bladder retractor.
 T. Aneurysm needle.
 U. Worral's needle.
 V. Gloves, 4 pairs.
 W. India-rubber sheeting.
 X. Long scissors—angular.
 Y, Z. 2 Scissors—straight, blunt.</p> |
|---|---|

The self-retaining retractor depicted in the illustration is that devised by the author. The clamp is the Berkeley-Bonney pattern. The angular forceps are Kocher's. Two pairs of dissecting forceps will be required, one long for the operator and one short for the instrument sister, and two pairs of straight scissors likewise. The spring clips are to keep the body-cover in position. The Michel's clip apparatus is the author's pattern. The india-rubber sheeting is to protect the wound edges, if the surgeon elects to use it.

The object of the radical operation is to remove the growth together with as much tissue of the pelvis as is possible, including the lymphatic glands, so as to ensure, as far as can be, that all tissues infiltrated with cancer cells, that have spread from the growth shall be extirpated. This means that the ureters have to be dissected clear of the growth, a dangerous procedure since they may be cut or may have to be cut, but more often they are stripped of a good deal of their blood supply and so slough sometime during the first 9 days of convalescence. As the lymphatic glands may be adherent to the external or internal iliac veins their removal in such circumstances is also highly dangerous, the vein on occasions being wounded and having to be tied. The operation is associated with the name of Wertheim owing to his improvement of removing

ALLEN & HANBURY'S

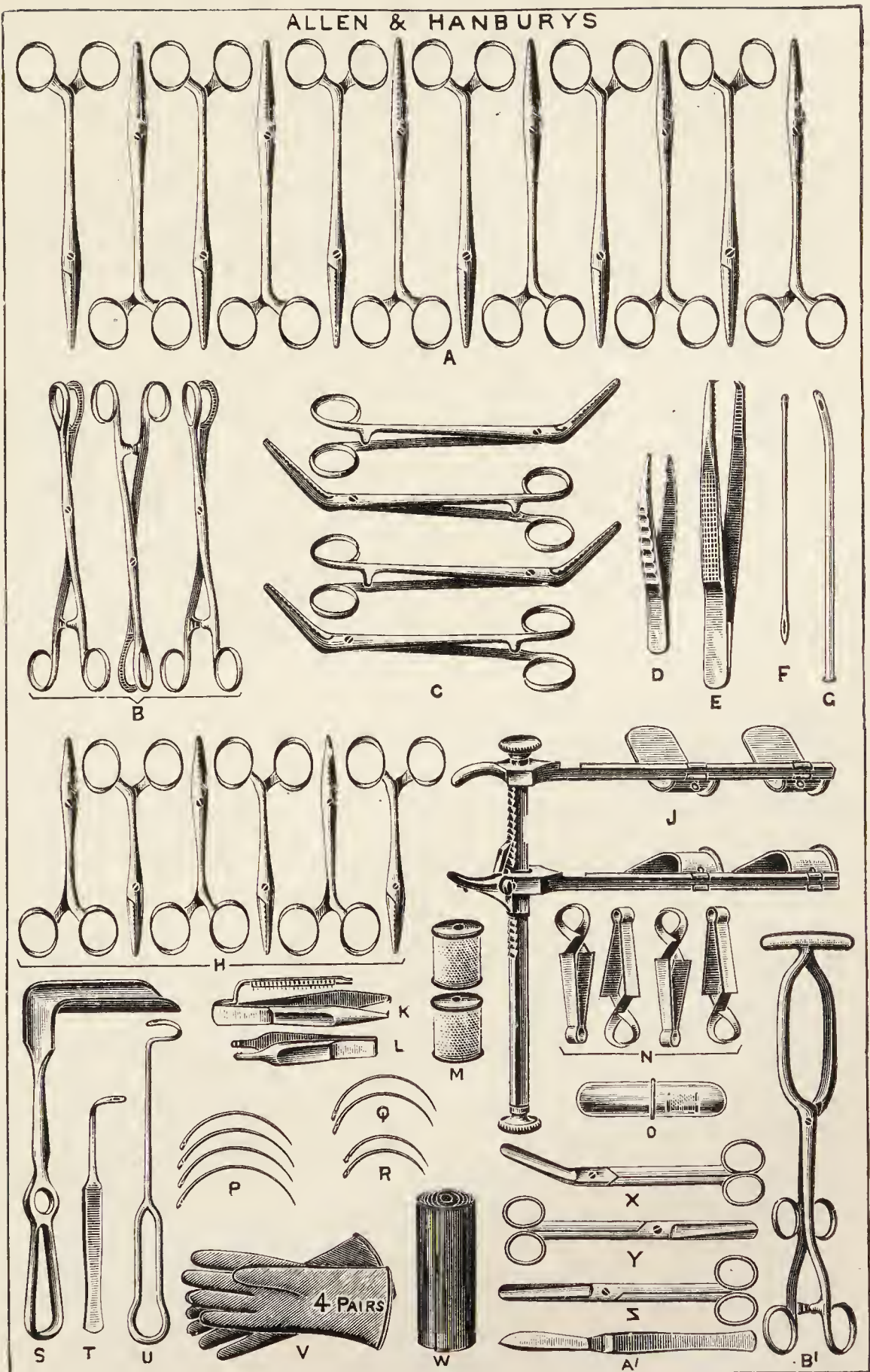


FIG. 58.

the growth in a bag of vagina, by clamping and then dividing the canal well below the level of the growth. This was a remarkable improvement in that it reduced the danger of a local recurrence to a minimum.

Abdominal Hysterectomy—Myomectomy—Ovariectomy—Oophorectomy—Salpingectomy—Salpingostomy—Salpingo-Oophorectomy—Ventral-Suspension—Shortening of the Round Ligaments—Cæsarean Section—Appendicectomy.

- | | |
|--|--------------------------------------|
| A. 12 Short pressure forceps. | M, N. Michel's clip apparatus. |
| B. 3 Long pressure forceps. | O. 2 Rubber drainage tubes, |
| C. 3 Ring forceps. | $\frac{3}{4}$ in., $\frac{1}{4}$ in. |
| D. Volsellum forceps. | P. Catheter. |
| E, F. 2 Dissecting forceps, long
and short. | Q. 2 Tubes catgut, No. 2. |
| G. Self-retaining retractor. | R. 2 Reels silk, No. 4, No. 2. |
| H. 4 Spring clips. | S. 4 No. 5 half-circle needles. |
| J. Probe. | T. 2 No. 9 " " " |
| K. 2 Scissors, blunt pointed. | U. 2 No. 13 " " " |
| L. Scalpel. | V. Gloves, 4 pairs. |

In addition to the list of instruments enumerated, some surgeons wish bowel-clamps to be included, in case a portion of the bowel has to be resected. Those surgeons who use Reverdin's needle, or some modification thereof, will require No. 13 needles only.

Some of the operations indicated can easily be performed with only a few of the instruments mentioned in this list. A surgeon, however, cannot be certain, until he has opened the abdomen, of the exact condition which will be disclosed. The author finds it more convenient, except in the case of the radical operation for cancer, to work always with the same number and variety of instruments, and with them the most serious, as well as the most simple, of the operations enumerated above can be performed.

The probe is put out in case the appendix has to be removed, when it is used to push the stump below the purse-string suture surrounding it. A pair of Spencer Wells forceps will do equally well.

There is no need to discuss the operations mentioned

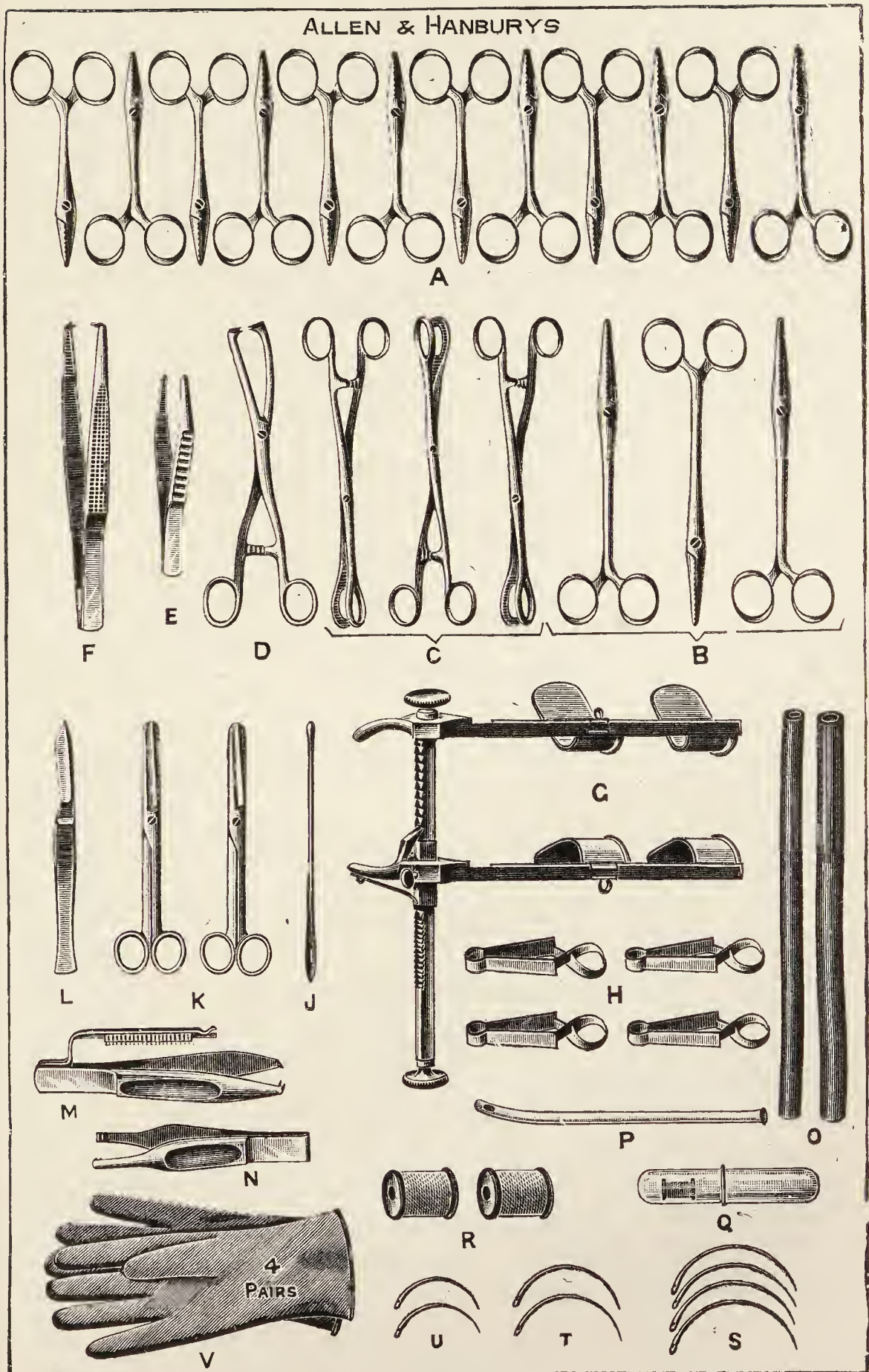


FIG. 59.

above, since all that it is requisite for the nurse to know concerning most of them has been mentioned in the text. Abdominal hysterectomy is either total or subtotal (supra vaginal). Total when the whole of the uterus is removed, subtotal when the body of the uterus only, at the level of the internal os, is removed. Oophorectomy, *i.e.* the removal of normal ovaries is now but very rarely practised. If it is absolutely necessary to stop menstruation, and radium or X-rays are not available, it is better to remove the uterus than the ovaries. Salpingostomy is an operation devised to open a Fallopian tube which is closed by inflammation and which is, therefore, an impediment to pregnancy.

Vaginal Hysterectomy—Colpotomy.

- A. Clover's crutch.
- B. 6 Long pressure forceps.
- C. 3 Ring forceps.
- D. Volsellum forceps.
- E. Auvard's speculum.
- F. Worrall's needle.
- G. Bladder sound.
- H. Scalpel.
- J. 2 Scissors, blunt pointed.
- K. 4 Spring clips.
- L. Catheter.
- M, N. 2 Dissecting forceps, long and short.
- O. 2 Vaginal retractors.
- P. 4 No. 5 half-circle needles.
- Q. 2 No. 9 „ „ „
- R. Reel silk, No. 4.
- S. 2 Tubes catgut, No. 2.
- T. Gloves, 4 pairs.

For the operation of colpotomy, that is opening the pouch of Douglas by an incision through the posterior vaginal fornix, the instruments indicated above will be required with the exception of the bladder sound, the pedicle needle, the No. 5 half-circle needles, and the silk. Three pairs of pressure forceps will suffice. The ring forceps are used as swab holders.

For this operation and the succeeding operations indicated, a Clover's crutch will not be necessary, if the operation table is provided with steel uprights to hold the ankles.

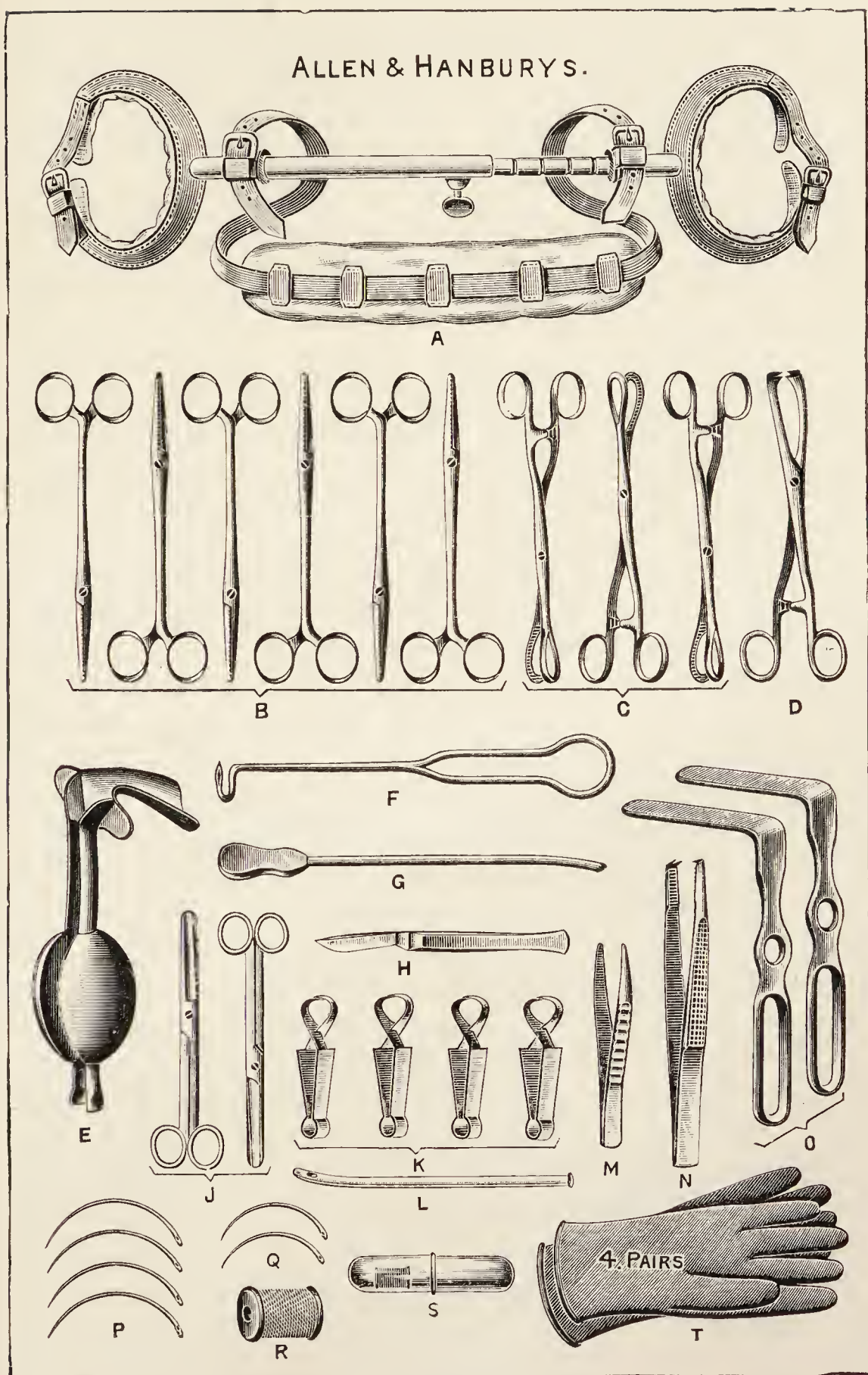


FIG. 60.

Dilatation of the Cervix and Curettage of the Uterus.

- | | |
|-------------------------------|---------------------------------|
| A. Clover's crutch. | L. Uterine sound. |
| B, C. 2 Dissecting forceps. | M. Auvard's speculum. |
| D. 2 Volsellum forceps. | N. 2 No. 9 half-circle needles. |
| E. 2 Long pressure forceps. | O. Gloves, 4 pairs. |
| F. 2 Ring forceps. | P. 2 Playfair's probes. |
| G. Metal dilators. | Q. Flushing curette. |
| H. 4 Spring clips. | Catheter (omitted in illus- |
| J. 2 Scissors, blunt pointed. | tration). |
| K. Tube catgut, No. 2. | |

If during the dilatation the cervix has been lacerated and the bleeding is free, the dissecting and pressure forceps and the needles and catgut will be required for suturing.

The ring forceps are used as swab holders.

The pattern of the metal dilator depicted is Fenton's.

The cervix is dilated in some cases of dysmenorrhœa, to allow the inside of the uterus to be felt with the index finger, to allow the curette to be used, and as a preliminary to the removal of uterine polypi or a submucous fibroid.

The operation of curetting consists in scraping the endometrium off the wall of the uterus. It is employed in cases in which the endometrium is very thick and in which there is excessive menstrual bleeding. Again curetting may be successful in the treatment of sterility, as one medical student at his final examination put it, "a new tenant prefers a new wall paper." The uterus is also curetted to obtain a specimen of the lining to ascertain whether the patient is suffering from cancer. Lastly in the condition known as subinvolution, in which the uterus fails to return to its proper size after labour, curetting may be of assistance. Taking one case with another, however, curetting is a disappointing operation and one very much abused, quite apart from the fact that it may be a very difficult and dangerous operation, though supposed to be easy and safe. Except for a very few conditions women are generally worse after a curetting than before, some of them very much worse, though curiously enough, this is no reason for curetting them again.

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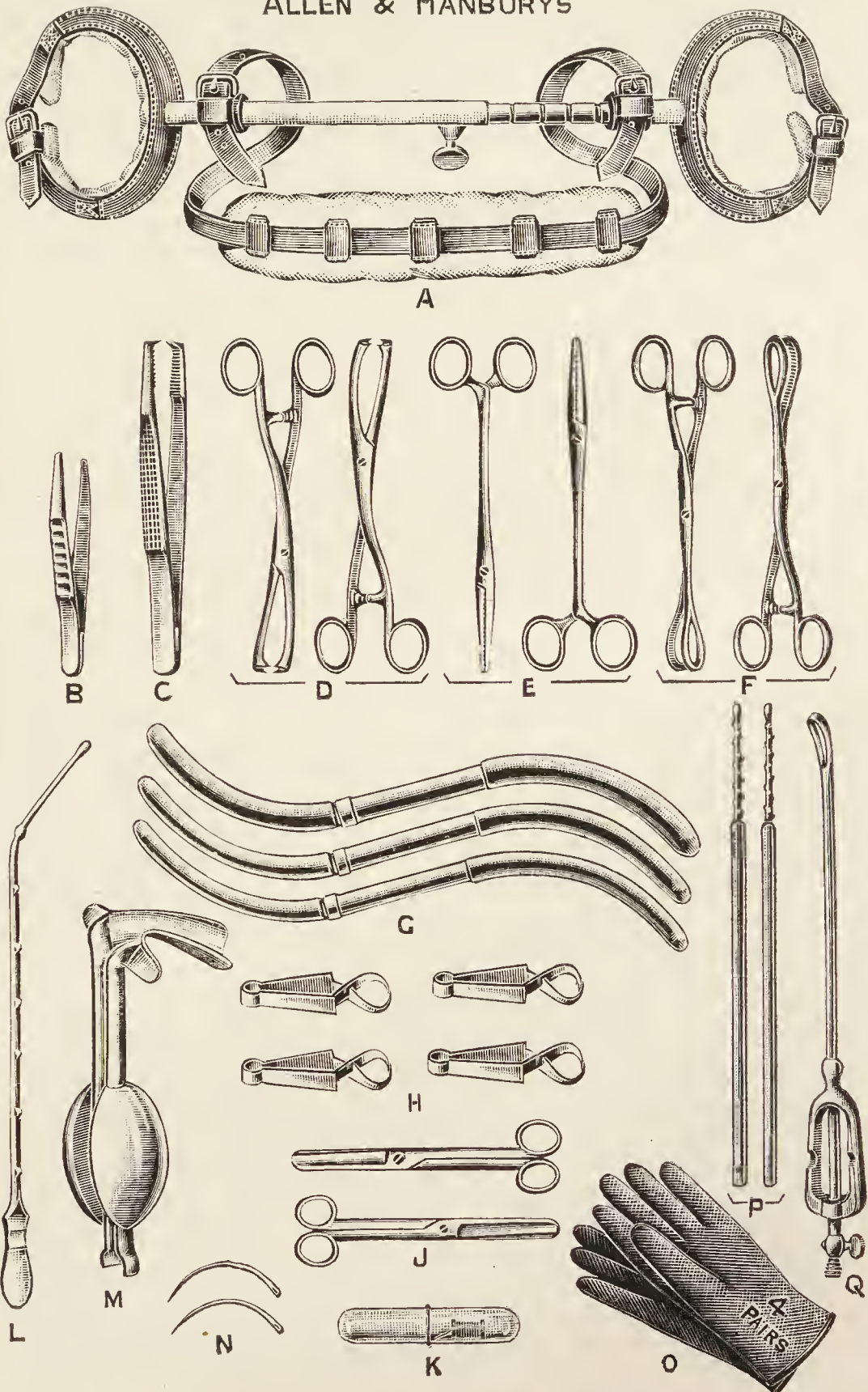


FIG. 61.

**Perineorrhaphy — Colporrhaphy — Trachelorrhaphy —
Amputation of the Cervix—Removal of a Sub-
mucous Fibroid, of a Fibroid or Mucous Polypus.**

- | | |
|---|---|
| A. Clover's crutch. | L. Auvard's speculum. |
| B. 3 Short Kocher forceps. | M. Bladder sound. |
| C. 6 Short pressure forceps. | N. 2 No. 5 half-circle needles. |
| D, E. 2 Dissecting forceps, long and short. | O. 2 No. 9 " " " |
| F. Scalpel. | P. 3 Tubes of catgut, 2 No. 2
1 No. 3. |
| G, H. 2 Scissors, sharp and blunt pointed. | Q. 4 Spring clips. |
| J. Volsellum forceps. | R. Catheter. |
| K. 2 Ring forceps. | S. Gloves, 4 pairs. |

For the operation of trachelorrhaphy, amputation of the cervix, removal of a sub-mucous fibroid or polypus metal dilators will be required.

The ring forceps are used as swab holders.

The operation of perineorrhaphy consists in fashioning a new perineum, the triangular structure between the lower inch of the vagina and rectum and, in many cases, also curing the bulging of the lower part of the rectum (rectocele) with which a deficient perineum is often associated. The operation is principally concerned with removing the excess of vaginal wall, suturing the levatores ani and adjacent connective tissue together, and reducing the size of the vaginal orifice.

Colporrhaphy is indicated when the woman is troubled with a bladder that partly bulges through the vaginal orifice and leads to urgency of micturition. The operation consists in removing the excess of the anterior vaginal wall, separating the bladder from the supra-vaginal cervix, pushing it up and inserting sutures below it so that it cannot again bulge.

Trachelorrhaphy is not a common operation; it is performed in cases in which leucorrhoea is profuse and due to a chronic cervicitis associated with a split cervix. The split cervix is repaired by making its edges raw and then suturing them together. If the cervix is badly split many

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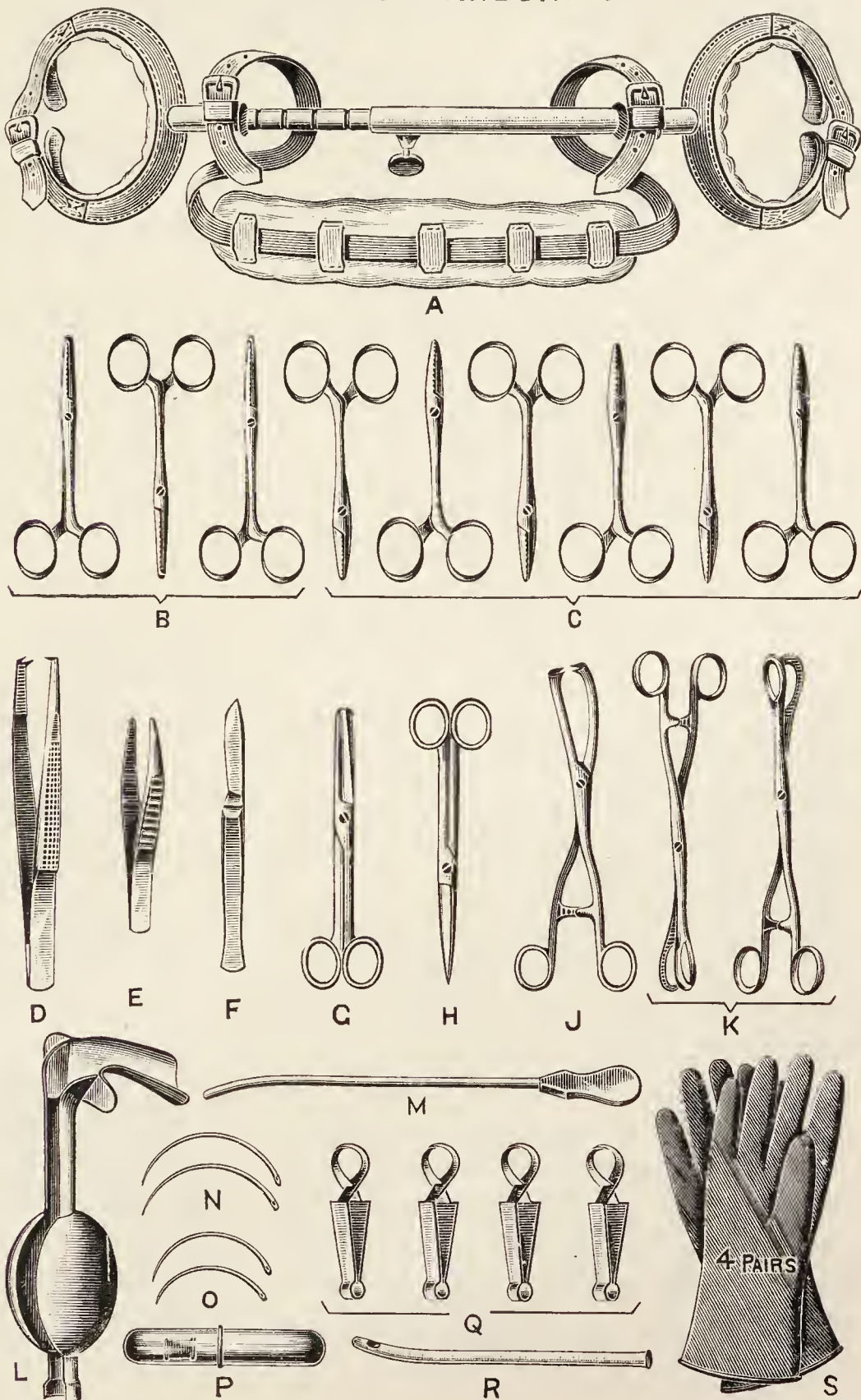


FIG. 62.

surgeons think that amputation is the best treatment. Trachelorrhaphy is also performed in some cases of sterility.

Vesico-Vaginal and Recto-Vaginal Fistulæ.

- A. Clover's crutch.
- B, C. 3 Scissors—2 blunt pointed, 1 sharp pointed.
- D. 4 Long pressure forceps.
- E. Scalpel—narrow blade.
- F, G. 2 Dissecting forceps, long and short.
- H. Vaginal retractor.
- K. Cleft palate needle-holder.
- L. 2 Ring forceps.
- M. Bladder sound.
- N. Auvard's speculum.
- O. 2 No. 2 cleft palate needles.
- P. 2 No. 9 half-circle needles.
- Q. 4 Spring clips.
- R. 2 Tubes catgut, No. 1, No. 2.
- S. Gloves, 4 pairs.

In the absence of a cleft palate needle-holder, a long pressure forceps can be used. A vesico-vaginal fistula, high up in the anterior fornix is difficult to close. It is easier in such a case to use cleft palate knives, forceps, needle-holders, and needles.

The vaginal retractor will be required for a recto-vaginal fistula. If the surgeon elects to use a Reverdin's needle when performing any vaginal operation, the ordinary needles may not be required.

The constant passage of urine or fæces into the vagina leads to such inconvenience and misery that, if possible, the hole connecting the various organs must be closed by operation. It is, however, only when the cause of the fistula has been traumatic that an operation is indicated, since if due to cancer the condition is hopeless, and if to syphilis or tubercle, the disease itself must be treated.

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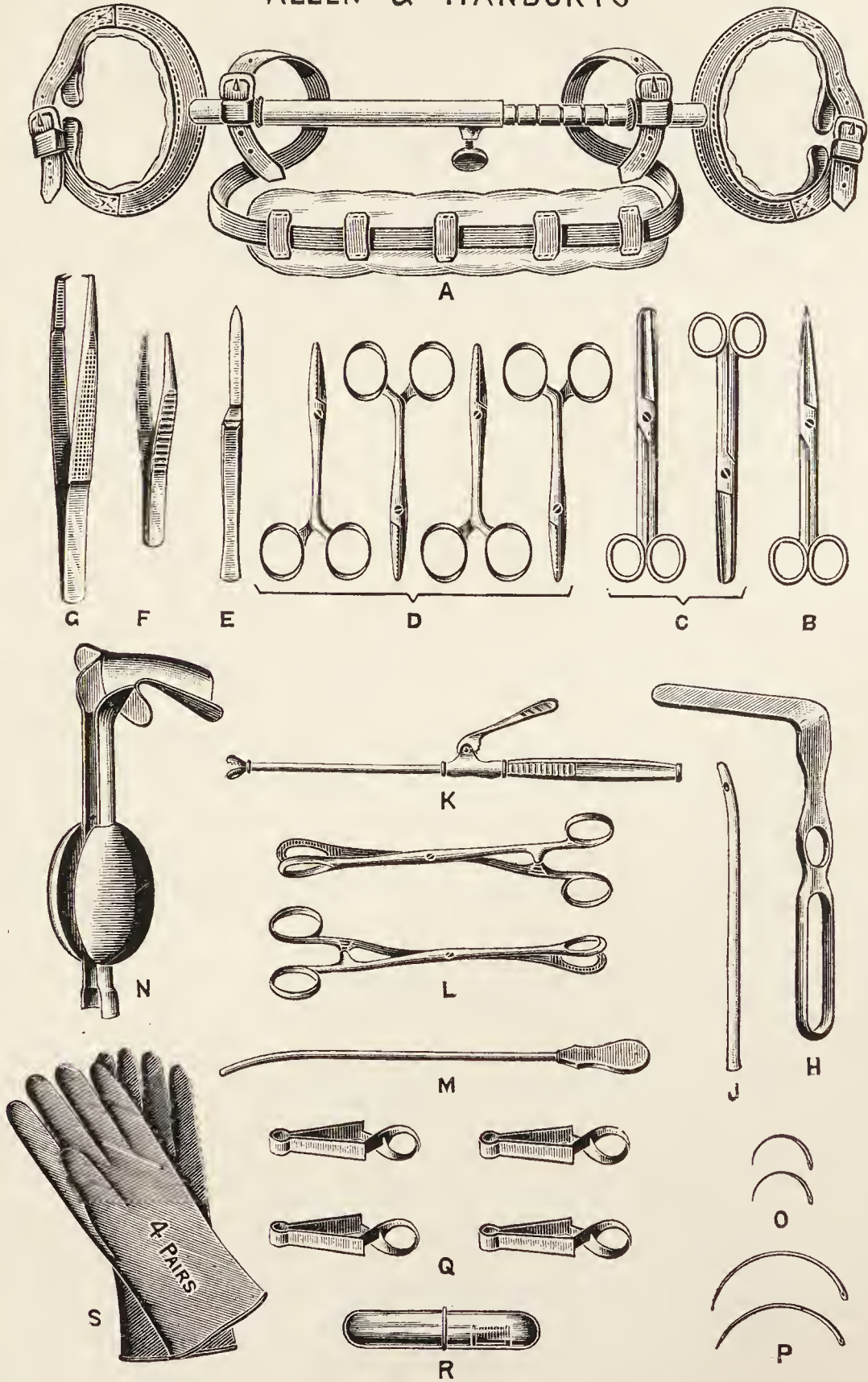


FIG. 63.

Cystoscopy.

The following articles are required for cystoscopy :—

- A. Clover's crutch.
- B. Cystoscope and battery.
- C. Syringe for washing out the bladder.
- D. Tube and funnel.
- E. Syringe for applying novocaine to the urethra.
- F. Glass measure.
- G. 2 Kidney trays.
- H. Gloves.
- Solution of novocaine.
- Jar of glycerine.
- Can of lotion.

The surgeon will use either the tube and funnel or the bladder syringe for injecting water into the bladder. The urethral syringe and novocaine are for a local anæsthetic if the surgeon wishes.

Method of Sterilizing the Cystoscope.—Before use the instrument is placed in 1 in 60 carbolic acid solution for 30 minutes. After being used the cystoscope is carefully flushed through with cold water to remove any blood clots that may be present, and then placed in 1 in 60 carbolic acid solution for 15 minutes after which it is rinsed through with methylated spirit before being dried, all screws, caps and washers being removed.

Duties of the Nurse.—The light of the cystoscope should be tested before handing the instrument to the surgeon. The patient must be placed either in the lithotomy position or on her back with a sand bag under her pelvis.

The temperature of the solution to be used for washing out the bladder is 100° F. The nurse will have to keep the tubes and funnels filled, or if syringes are used she may be directed to fill these. If the cystoscope is being inserted into the bladder with the patient on her back the nurse, by arranging two macintoshes, one on the abdomen and the other across the knees, will ensure that the patient does not get wet from the "drippings."

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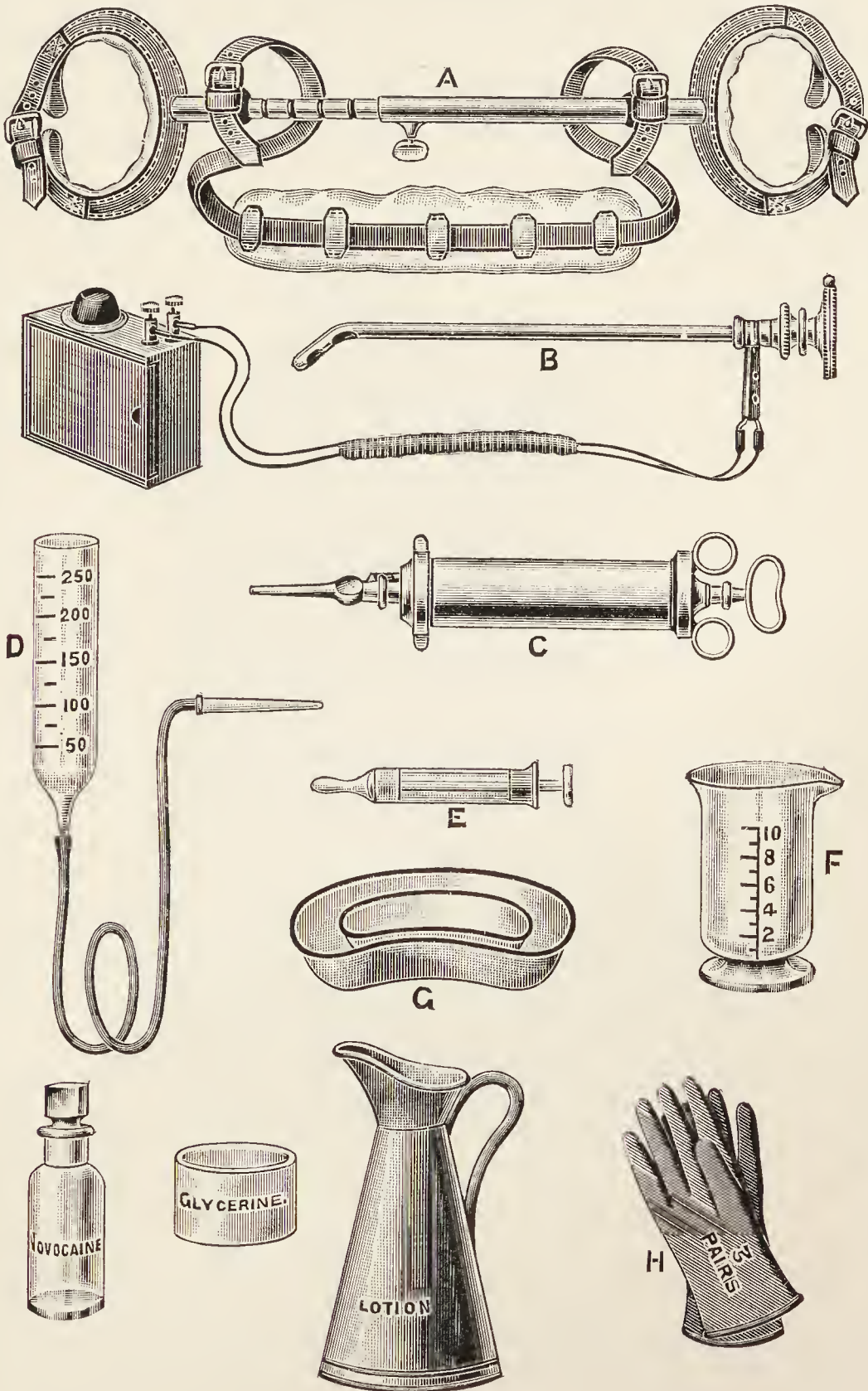


FIG. 64.

DIATHERMY.

Instruments.—In addition to the Diathermy apparatus, the instruments required will depend upon the site of the operation. The instruments must be sterilized by the usual method, and if the nurse does not know which instruments will be required she must ask the surgeon.

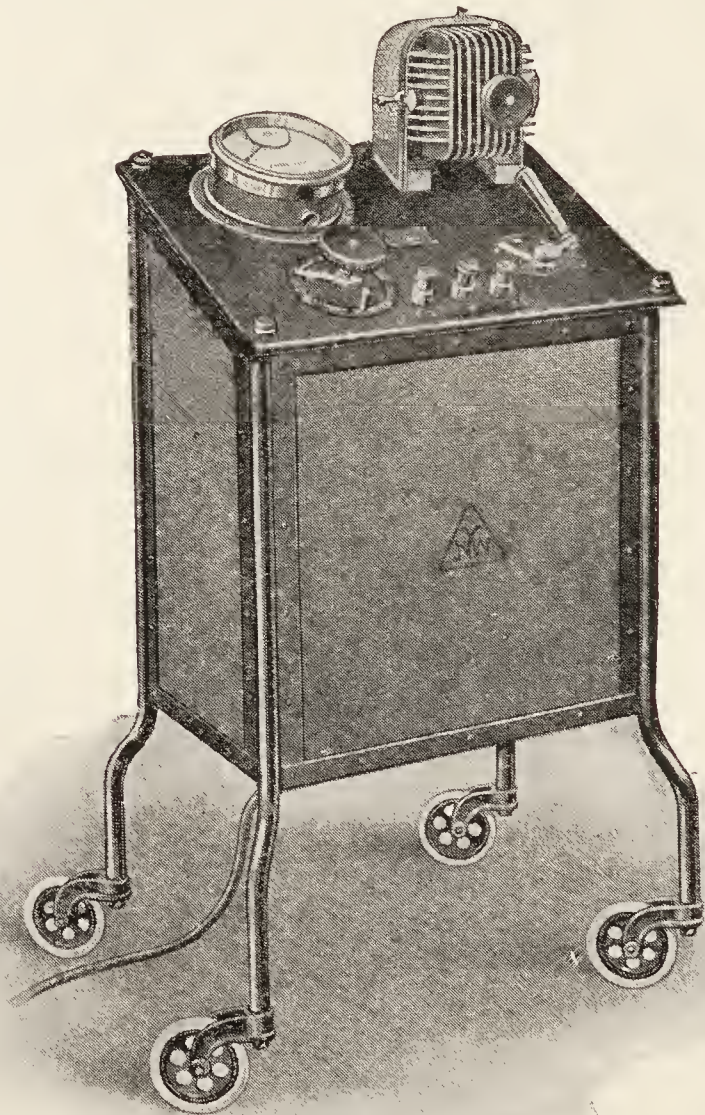


FIG. 65.—DIATHERMY APPARATUS.

Preparation of the Patient.—The patient is prepared as for any other operation, on that portion of the body in which the diathermic treatment is to be carried out.

To Clean the Electrodes.—Scrape any blood clot that has accumulated on the electrodes and then spark the gap.

Duties of the Nurse.—A nurse would not be accused of exceeding her duties if she reminded the anæsthetist to remove the ether bottle from the anæsthetic wagon. The nurse may be directed to apply the diathermy pad to the abdomen or thigh by the surgeon. The pad must be placed between pieces of lint soaked in normal saline solution.

The handle of the electrode should be covered with a sterile towel.

Removal of a Urethral Caruncle.

- A. Clover's crutch.
- B. Actual cautery.
- C. Bladder sound.
- D. Dissecting forceps.
- E. Scissors, sharp pointed.
- F. Gloves, 3 pairs.
- G. 4 Spring clips.

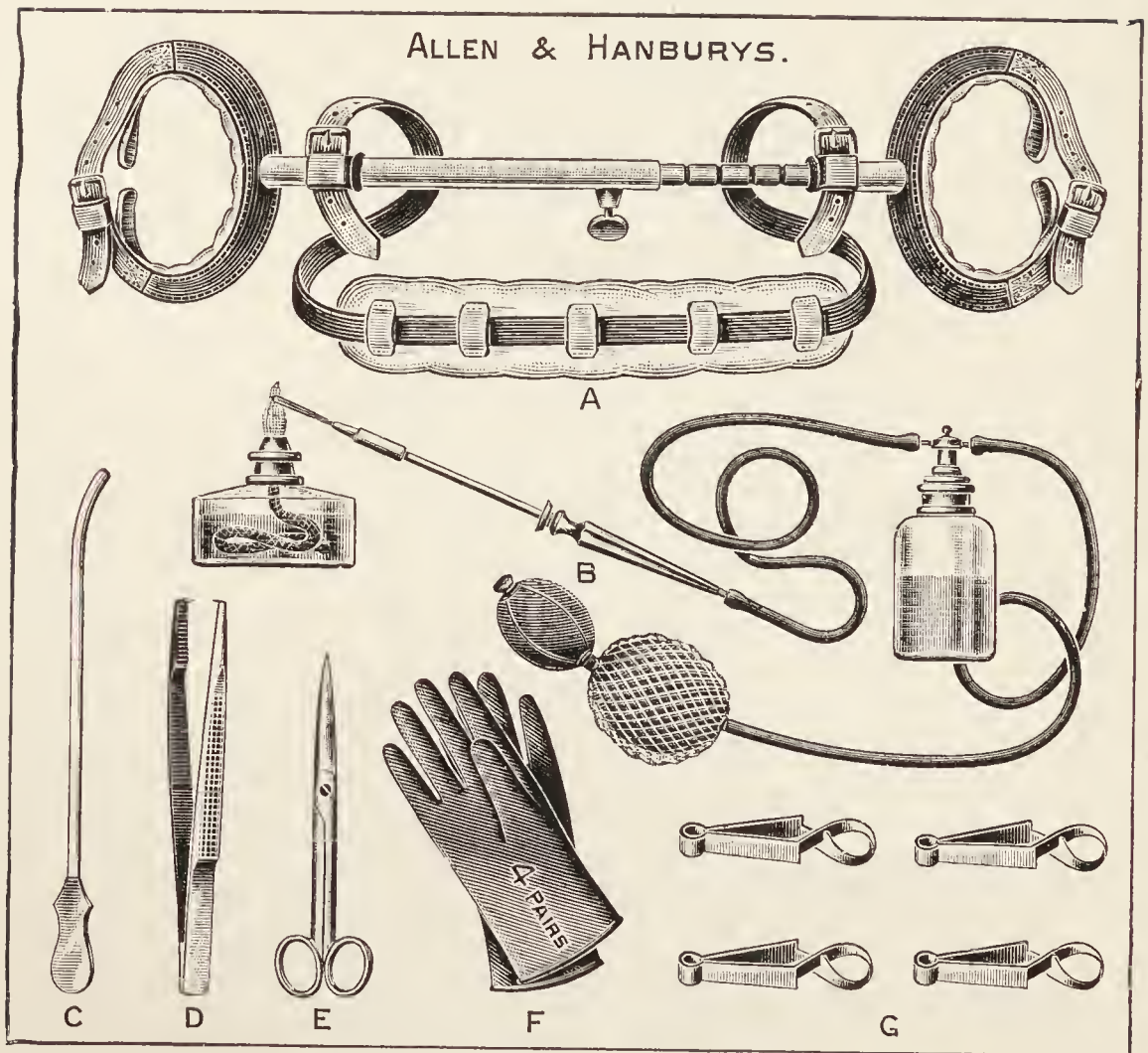


FIG. 66.

The caruncle having been removed with scissors the bleeding base is cauterized, not because of the bleeding but to ensure that every portion of the caruncle is destroyed, recurrence otherwise being common.

Out-Patient Department.

- | | |
|-------------------------|-------------------------------------|
| A. Sims's speculum. | H. Napier's cup and stem pessaries. |
| B. Rectal speculum. | J. Bladder sound. |
| C. 2 Ring forceps. | K. Catheter. |
| D. Ring pessaries. | L. Volsellum forceps. |
| E. Hodge pessaries. | M. Fergusson's speculum. |
| F. Uterine sound. | N. Gloves. |
| G. 2 Playfair's probes. | |

Solution of biniodide of mercury (1 in 2000).

Absorbent wool swabs.

Absorbent wool.

Iodized phenol; carbolic acid, a saturated solution of picric acid in rectified spirit.

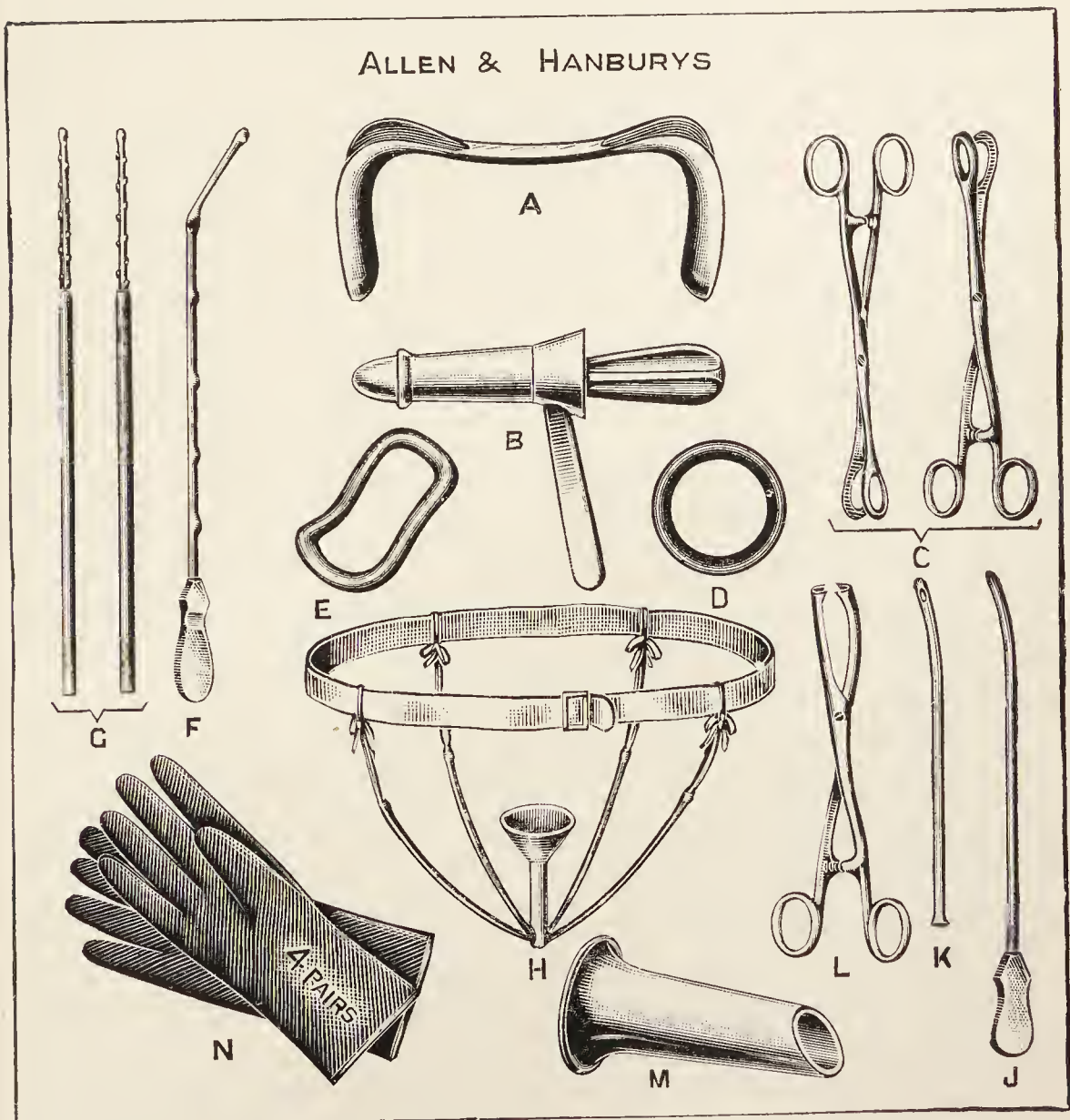


FIG. 67.

CHAPTER XXIV.

CARE OF THE PATIENT IN TRANSIT FROM THE WARD TO THE ANÆSTHETIZING ROOM AND FROM THE THEATRE TO THE WARD.

1. A canvas stretcher and a macintosh covered by two towels are placed on the ambulance.

2. Prior to the patient being placed on the ambulance any dental plate she may have in her mouth should be removed and any hairpins in her hair taken out. She should also leave her handkerchief behind.

3. The patient is lifted on to the ambulance and covered with two blankets.

4. The doors of the anæsthetizing room must be kept closed so that the patient, when she is wheeled into it, shall not be able to see the interior of the operating theatre, since it is important to avoid causing her any mental distress. The sight of the necessary preparations, of the presence of visitors, perhaps of an operation just being concluded, or of blood, will be most alarming to some patients.

5. On the arrival of the patient in the anæsthetic room, if the anæsthetist prefers her hair to be covered, this should be done by means of a sterile towel folded round the back of the head and pinned in front, in such a way that all the hair is inside the towel.

6. Before the administration of the anæsthetic is begun the neck of the nightgown and jacket worn by the patient should be untied and loosened. The patient should not turn in the ends of the night-gown because if pulled from beneath her, when under the anæsthetic, they might rub

the skin on her back. A nurse should remain by the side of the patient until she is under the influence of the anæsthetic.

7. At the termination of the operation the patient should be very gently lifted on to the ambulance, and covered with blankets. Her head should be turned to the left side, a towel should be placed under her chin and a porringer containing a pair of tongue forceps should be placed by the side of her head, in case she vomits, or ceases breathing.

8. On the way back to the ward the nurse should push the angle of the lower jaw of the patient forwards, and watch carefully that she continues to breathe properly.

9. If the patient stops breathing and gets blue in the face this is generally an indication that the tongue has fallen back, blocking the air passage, because the chin is not being held properly, and in such a case if further manipulation of the chin is not sufficient, the nurse, unless a doctor is near, should take hold of the tongue of the patient with the pair of forceps and pull it forward between the teeth.

10. On her return to the ward the patient should be very gently lifted by the canvas stretcher on to her bed which has been specially prepared meanwhile, and covered with blankets, *the hot-water bottles which have been placed in the bed during the operation being removed*. To remove the canvas stretcher after the patient is in bed, she should be gently rolled from one side to the other.

11. A pillow should then be placed under the knees of the patient, and in the case of an abdominal operation a pad is applied to her vulva, so that any loss from her vagina can be easily detected.

12. Hot-water bottles, if they and their stoppers are thoroughly protected with thick flannel covers, may be placed outside the blanket along the lower extremities of the patient. Some surgeons prefer that the hot bottles should be removed altogether when the patient is returned to her bed and until she has recovered from the anæsthetic.

13. The bed-clothes are then arranged over the patient, her head is turned to one side and the pillow put well under her shoulder, a towel is placed under her chin and a

porringer on the locker by her side, to be immediately available if she vomits.

14. The pulse should then be felt and a note made as to its rate and character.

15. If, after an operation, blood comes through the dressings the nurse should act according to the amount of loss she judges to have taken, or to be taking, place. Thus if the amount is reasonably slight and there is only a "staining" more sterilized wool should be applied under another bandage. It is quite wrong, although not unusual in such cases, for the nurse to take off all the dressings and re-apply fresh ones, much to the annoyance of the surgeon.

On the contrary it is not unusual for a nurse to treat a severe hæmorrhage by applying more wool and a bandage when the only thing to do is to send for medical assistance at once, meanwhile removing the sodden dressing and firmly applying fresh dressing.

16. The additional precautions after a "spinal" anæsthetic are detailed on page 265.

CAUTION.

During the early stages of an anæsthetic the patient may sometimes struggle, and if an "alcoholic," somewhat violently. Nurses usually apply far too much force in their endeavours to restrain such struggles. The force to be applied should be sufficient only to counteract the struggles, that is, the patient should not be pinned down.

If hot-water bottles are left in the bed, even outside the blankets, a restless patient may easily disturb them and burn herself. A certain amount of intelligence is required when using hot-water bottles. Thus if the character and rate of the pulse are good, and the patient is perspiring, or if the day is very hot, their use is superfluous, if not injurious.

If the operation is an abdominal one and there is retching or vomiting, the nurse must support the abdomen with a hand on each side of the incision to prevent undue straining of the sutures and this will also lessen the pain. When

the vomiting has ceased, the nurse should cleanse the mouth with small wool dabs wrung out of a solution of glycothymoline and held in forceps.

The nurse should not pay any attention to what the patient may have said under the influence of the anæsthetic, and should never repeat it either to the patient or anyone else.

CHAPTER XXV.

ASEPTIC TECHNIQUE FOR OPERATIONS IN A PRIVATE HOUSE.

THE facility and safety with which operations can be carried out in private houses depends upon the means and surroundings of the patient and the training and intelligence of the nurse. In some cases, when efficient nursing assistance can be obtained, and the various articles of furniture necessary for an operation can be hired, and a complete sterilized outfit can be purchased, an operation can be conducted with comfort to the gynæcologist and, as far as the aseptic technique is concerned, with safety to the patient. On the other hand, an operation may have to be performed amidst surroundings which are very primitive, and the nurse will have to do the best she can. An intelligent and well-trained nurse will usually be able to make satisfactory arrangements with the means at her disposal. It is only the unintelligent, badly trained and stupid nurse who will create difficulties and fuss everyone about the place.

When an operation is to be performed in a private house the following subjects must be considered by the nurse :—

1. Preparation of the room.
2. Preparation of the instruments, sutures, ligatures, and swabs.
3. Preparation of the nurses and their duties at the operation.
4. Preparation of the dressings.

Preparation of the Room.

Room.—If possible a room should be chosen which has a good light, is well ventilated, and is not near the water-closet. If the window of the room is overlooked it should be covered with thin muslin or smeared with sopacious or a thin solution of whitewash. The day preceding the operation the walls and all the woodwork in the room should be thoroughly dusted; particular care being taken with the tops of the doors and windows. The carpet, curtains, and upholstery on the bed should be removed, together with the pictures and all the furniture which will not be required. The woodwork and furniture should be dusted with damp dusters, and the walls also, should they happen to be painted. The floor should then be thoroughly scrubbed. The furniture and woodwork should again be dusted with a damp duster on the morning of the operation.

If, however, the operation is one of emergency, and there is not sufficient time to allow of all these preparations being made, then dust should not be disturbed by dusting. The furniture which will not be used should be removed as gently as possible, and a drugget or sheet wrung out in lysol (1 in 160) should be tacked down over the carpet, beneath the operating table, and the furniture not in use should be covered with clean sheets.

Furniture.—The following articles must be procured and arranged in convenient situations (see Figs. 68 and 69):—

Operating table.	Instrument table.
Table for dressings.	Swab table.
Washstand.	Sterilizer.
2 Basins for hand lotion.	Anæsthetist's table and stool.

1. As a rule the doctor will bring his own operating table. If not, a table must be procured about 4 feet long, 2 feet broad, and 28 inches high for the patient to lie on during the operation. An ordinary kitchen table will be found to meet these requirements.

2. Six small square tables, one for the dry sterilized swabs or dabs, or if these are being rinsed then this table will be

used to hold the two basins containing the water ; one for the instruments ; two for basins containing the lotion for the hands ; one for the anæsthetist's apparatus, and one for the dressings. Tea tables, work tables, washstands, or dressing

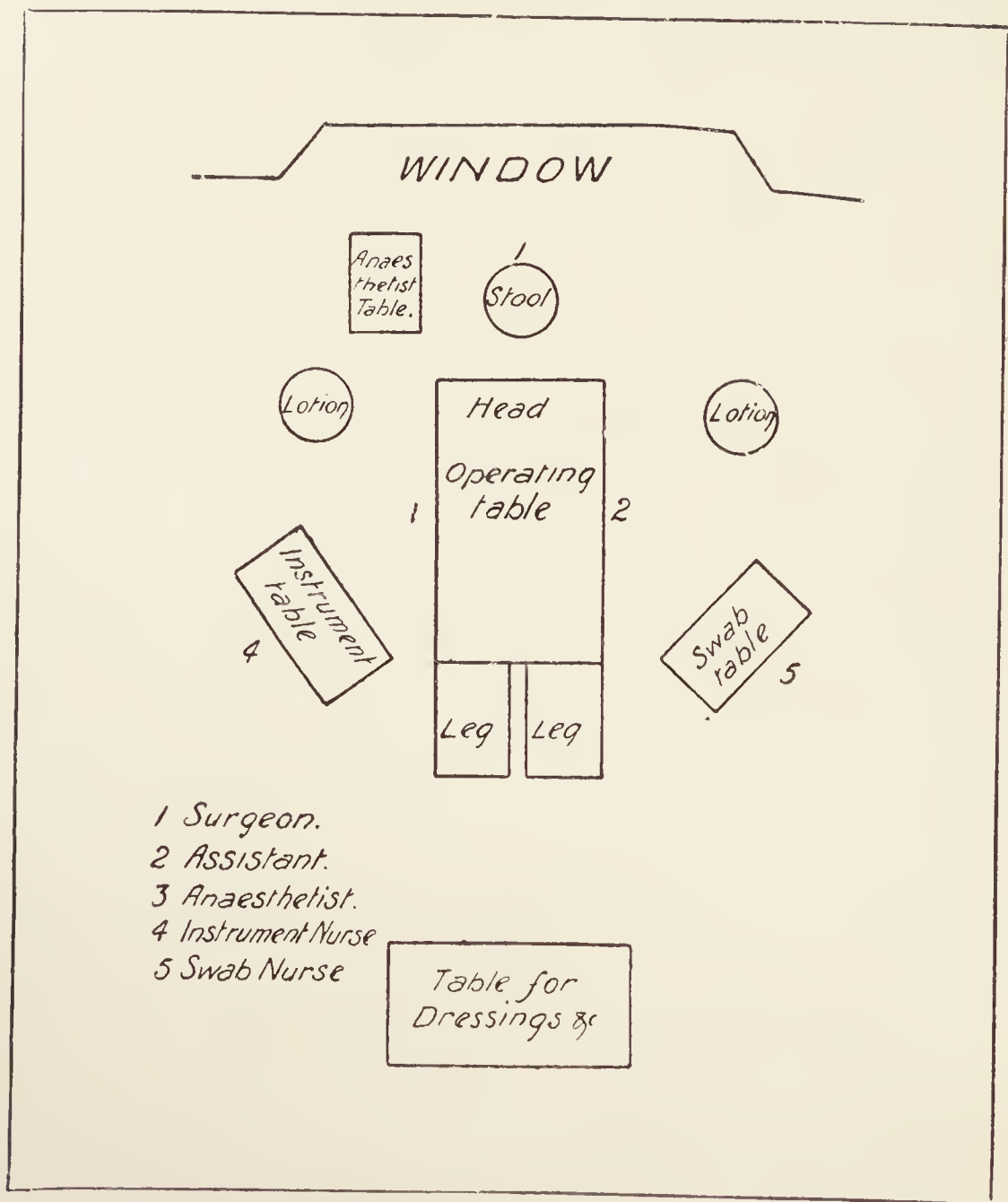


FIG. 68.

Arrangement of tables for major operations.

tables will do, and if these are not available, very good substitutes can be made with ironing boards, or leaves from an extension table resting on chairs. Chairs or packing

cases will do for the hand lotion. These tables should be thoroughly dusted with a damp cloth, and then covered with clean sheets or towels, and, if polished, with thick layers of paper first.

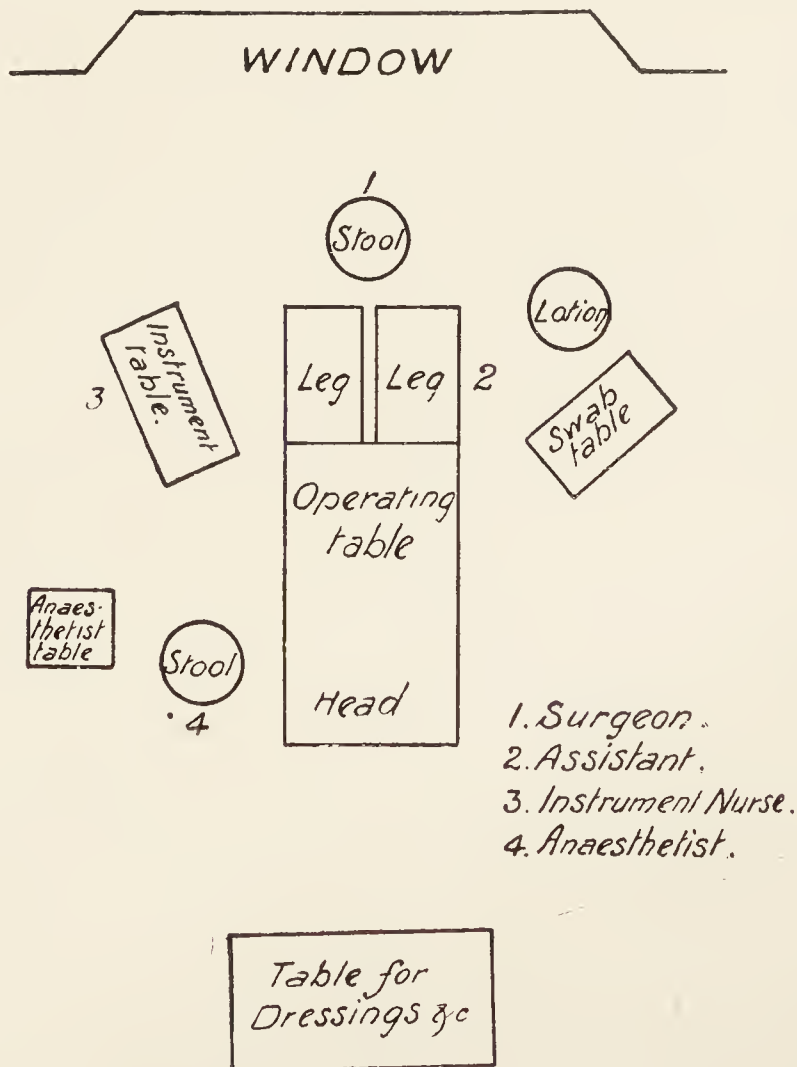


FIG. 69.

Arrangement of tables for minor operations.

3. Two chairs with wooden or cane seats, one for the anæsthetist and one for the operator if he needs it.

4. A washstand to hold the basins for washing the hands.

5. A nail-brush sterilized by boiling or immersion in a solution of biniodide of mercury (1 in 2000).

6. A cake of soap.

7. Two clean blankets, one sheet, and one piece of macintosh sheeting for the operating table.

8. If the doctor does not bring sterilized towels with him, clean towels, not new, must be procured. The towels should be sterilized by boiling. At least eight may be required.

9. Two dishes, one for the instruments, measuring, if possible, 12 inches square, and a smaller dish, 6 inches square, for the ligatures and sutures. Meat dishes will do very well. Many surgeons prefer their instruments to be arranged on sterilized towels, in which case these dishes will not be required.

10. Six basins, two in which to wash the hands, two to contain the lotion (biniodide of mercury 1 in 2000) for the hands, and two for the swabs if dry sterilized swabs are not used.

These dishes and basins should be thoroughly cleaned and scalded before use, and then turned upside down and covered with towels until they are required, in order that dust may be excluded. They can be efficiently sterilized before use by burning in them a little methylated spirit.

11. A sterilizer. It will be necessary to have a sterilizer of some description, even if the instruments have been already sterilized, because an instrument may be dropped during the operation and have to be re-sterilized. In the absence of a proper instrument-sterilizer, the nurse should procure a fish-kettle or saucepan large enough to take the instruments, and which has been properly scoured and cleaned, and lined with a towel.

12. One gallon of cold water, which has been boiled.

13. One gallon of boiling water. The mouths of the jugs containing the water should have gauze tied over them.

14. A foot-bath or pail, properly cleansed, for receiving any soiled water, or discharges.

15. A piece of oilcloth or linoleum to place under the

table when vaginal or vulval operations are to be performed, so that the floor of the operating room and the ceiling of the room below can be protected. If oilcloth cannot be procured, newspapers should be used.

16. The bedstead should be thoroughly cleaned, the mattress aired, and the bed made up with clean sheets, a piece of macintosh sheeting over the lower sheet, and a clean draw-sheet over this.

17. Two hot-water bottles carefully covered with flannel so that they will not burn the patient should be provided in case they are wanted. Especial care should be taken that the metal stopper is not in any way exposed. *Unless properly looked after, hot-water bottles are a source of the greatest danger to the patient, who, when unconscious after the operation, is unable to feel them burning, with a result that very serious ulcers are caused, which may take two months or longer to heal. Patients who are thus burnt may sue the doctor, nurse or nursing home, and heavy damages have been obtained in such cases.*

18. After an abdominal section or vaginal hysterectomy a cradle will be wanted. If a proper cradle cannot be procured a very good substitute may be made by buying some wooden hoops, of a suitable size, as used by children, cutting them in half, and then joining the pieces together by three lengths of wood and screws. Such a cradle can be made in quite a short time by some male member of the household.

19. A douche-can, brandy, nutrient enema-syringe for giving brandy enemata, and the solution for giving saline injections, if the operation is of a serious nature, should be available.

It is better that the patient should occupy another room until the time arrives for her operation, but if this cannot be managed, screens should be provided to prevent the patient being alarmed by the preparations for the operation, and for the same reason, when the time comes for the screen to be taken away, all the instruments should be covered over with towels. If the operation is at night

some sort of adjustable artificial light must be procured. An electric standard with a high candle-power lamp is the best. Gas decomposes chloroform, the result being very irritating to the throats of those present. In an emergency an acetylene bicycle lamp properly arranged will give a splendid light, and an electric torch may be found useful.

Preparation of Instruments, Ligatures, Sutures, and Swabs.

Instruments.—Any nurse who professes to take surgical cases should know the names of the principal instruments, because she may be asked to attend to the instruments during the operation. In private the surgeon will bring his own instruments. The particular instruments used in gynæcological operations will be found figured on pages 339 to 359. The method of sterilizing instruments will be found described on page 313.

Sutures, Ligatures.—Sutures are of two varieties, mattress and continuous. A mattress suture is not tied in the needle, its length should be about 12 inches and it should be threaded with one end longer than the other. A continuous suture should be tied in the needle, with one knot close to an end of the suture and its length should be about 24 inches. The average length of a ligature is 18 inches.

A nurse who intends to take up surgical work in private should master the rules set out for a theatre sister on page 322, especially those which will be appropriate to operations in a private house. The method of sterilizing sutures and ligatures will be found on page 314.

Swabs, Dabs.—A method of making swabs for abdominal operations and dabs for minor operations and their sizes will be found on page 316. Swabs must be sterilized by steam pressure or by boiling, and dabs may be sterilized by chemical disinfectants.

CHAPTER XXVI.

PREPARATION OF THE NURSE—PLACING THE PATIENT IN POSITION—ASSISTANCE DURING AND DUTIES AFTER THE OPERATION IN PRIVATE OPERATIONS.

THE preparation of the nurse, and the assistance she will and may be required to give during the operation, will be a combination of those to be found fully described under the rules set out on pages 322 to 332 for the theatre and ward sisters and theatre nurse.

It is obvious that if she be the only nurse available she must do the best she can in the circumstances.

If possible, and especially if the operation is of a serious nature, two nurses should be available at the time of, and for a week following, the operation. In this case one nurse should act as theatre sister and the other as ward sister and theatre nurse combined.

In the rules referred to, it will be seen that the nurses have to wear sterilized overalls, and, if requested, veils also. Nowadays the surgeon generally sends or brings a tin containing the sterilized clothing for the nurses and doctors, and coverings and towels for the patient. Such tins, containing the necessary articles of clothing for the surgeon, nurses, and the coverings, swabs, dabs, and dressings for the patient already sterilized, can generally be obtained in most towns of any importance.

These articles are packed in separate tins according to whether they are required for a major or minor operation. If such a tin is not available the nurse, as already stated, must sterilize a number of towels by boiling them, and in place of an overall she must pin a large towel round

her chin, so arranging it that it covers the front of her body.

Sterilized Articles that the Tin should contain for a Major Operation.

A body cover.	10 Small swabs.
6 Towels.	2 Yards of gauze.
3 Gowns.	Half-pound of absorbent wool.
3 Masks.	A many-tailed binder.
2 Large swabs.	A packet of safety pins.

Sterilized Articles that the Tin should contain for a Vaginal Hysterectomy or Minor Gynæcological Operation.

A pair of leggings.	3 Dozen dabs.
A perineal cover.	2 Yards of gauze.
4 Towels.	Half-pound of absorbent wool.
3 Gowns.	A T-bandage.
3 Masks.	

Figs. 49 and 50 show a sterilized tin containing these articles, as put up for the author by Messrs. Bell & Croyden. Different surgeons will vary the contents of these tins, according to their predilections, so that if the nurse is directed to procure such a tin, she must ask the surgeon whether he has a special tin of his own and if not what articles he requires. The towels are used for covering the instrument and swab tables, and any part of the surroundings of the patient thought necessary and not protected by the body or perineal covers, and for the hands of the surgeon and nurses.

The method of preparing the india-rubber gloves and the hands will be found described on pages 314 and 319.

India-rubber gloves should be worn at all operations, and by all concerned in the immediate performance of the operation except the anæsthetist. By their use the risk of infecting the patient is very much diminished since they can be boiled, whereas the hands cannot. In addition, they protect the hands of the nurse from contamination

with any pus that may be present, and so lessen the chance of her conveying infection to some other patient.

Placing the Patient in Position.

It is most important that a nurse who is doing surgical nursing in private should make herself thoroughly conversant with the proper method of placing the patient in position for an abdominal or vaginal operation. The nurse is referred to pages 262, 263, for a description thereof. In addition she should particularly remember :—

That every operating table has not got a foot piece which will let down and to which the legs can be fastened before the patient is tilted in the Trendelenburg position. In this case the legs of the patient cannot be fixed at right angles to her body, until she is tilted. While, therefore, the patient is being tilted the nurse must take hold of the ankles of the patient and, pushing them back, thus keep the legs at right angles to the body, otherwise the patient will slide down the table and will have to be readjusted. It is after the patient is in the required position that the ankles are tied to some part of the table.

Again, if a Clover's crutch is being used the nurse should remember that the rings of the cross-bar should be adjusted below the knees of the patient and not above. Also that the strap is passed over one shoulder, round the neck and under the opposite axilla.

Theatre training should always include the method of placing a patient in any of the recognized positions for operations. That it does not in all cases is evident from the pathetic scenes witnessed from time to time, when owing to the stupidity of the nurse the patient proceeds to slip into the lap of the anæsthetist, or the Clover's crutch is applied with the rings above the knees, the buckles in such a position that the straps cannot be attached and the strap entirely round the neck and nearly dislocating it. There is no use in telling the nurse in training *how* to fix the patient. The sister responsible for the training should have a live model on which the nurses can practise, one of

themselves will do quite well. It is quite time that those who are responsible for the training of nurses should attend to such practical details as are now being discussed. Nurses could very well do with more practical training and less theoretical, especially when the latter has no immediate connexion with their duties.

If the operation is vaginal or vulval in nature the nurse can improvise a contrivance to conduct blood from the site of the operation, and any lotion that is used, into the pail, as follows. A macintosh, covered with a sterilized towel, is placed under the buttocks of the patient. The macintosh and towel should be rolled several times at the end upon which the patient will rest, and be so arranged that it will form a ridge and prevent fluids escaping under the back of the patient. The sides should then be folded in, to form a gutter, and the free ends should be inserted into the pail.

The patient should also have on a thick pair of stockings so that the rings of the Clover's crutch shall not injure her by their pressure. In addition a piece of wool should be inserted between the strap and the thigh in the neighbourhood of the buckle of the ring, also to prevent the strap hurting the skin of the patient.

When a patient is fixed in the lithotomy position with a Clover's crutch, her body will be very unstable. It is therefore most important that the nurse should hold the patient in position by means of the crutch. If the nurse has to leave the patient she must ask the anaesthetist or some other person to hold the patient meanwhile. The author has knowledge of a case in which the patient fell off the table, with very serious results, when this precaution was not taken.

Preparation of the Dressings.

A list of the dressings which may be required for the different gynæcological operations will be found on pages 381, 382. The nurse must ascertain what dressings will be required.

Duties after the Operation.

Tidying the Room after Operation.—After the operation, and before the patient recovers consciousness, the soiled linen, operating table, and instruments should be removed and the room re-arranged, two tables being left, one for the dressings and one for the use of the nurse. If there is only one nurse she must ask some member of the household to do this, since, as mentioned before, she must not leave her patient.

An armchair and a camp-bed or sofa, if there is only one nurse and it is necessary for her to remain in the room during the night, should also be supplied. A lamp, candle, or electric light, properly shaded, so that the nurse can read, and write her report, without disturbing the patient, will be required. The blinds must be drawn and the room kept as quiet as possible, so that the patient may sleep when she comes out of the anæsthetic.

CHAPTER XXVII.

AFTER TREATMENT.

THE nurse must ascertain from the gynæcologist exactly how he wishes his patient treated after the operation, as individual surgeons have their own particular methods. The methods suggested in this chapter are the outcome of an experience of many thousands of cases and may be followed unless the nurse has directions to the contrary.

A record should be kept for every patient, under which is entered the pulse-rate, respiration-rate, temperature, the times the bowels have acted, the amount of sleep, the quantity of nourishment taken, and, if directed so to do, the quantity of urine passed.

Pulse.—The pulse-rate should be taken every four hours and charted. The pulse is by far the most important means we have of estimating how the patient is progressing after an operation, and all nurses would be wise to practise taking it on every suitable opportunity.

The pulse-rate is quickest for the first twelve hours after the operation, but during this time should not exceed 120. After this, as a rule, if everything is progressing satisfactorily, it falls below 100. If the pulse-rate does not fall, but continues to rise, this is, as a rule, a bad sign. In shock and hæmorrhage its rate may be increased to 140 or more, becoming at times uncountable, while in hæmorrhage the pulse is very soft and weak. Distension, if marked, will increase the frequency of the pulse-rate. In peritonitis the pulse-rate rapidly increases in frequency to above 120, and it is hard and wiry, its rate gradually becomes running in character, and at the end cannot be counted.

The Room.—The room must be well ventilated and kept at a temperature of 65° F. To accomplish this there should, if necessary, be a fire in the room and the window should be a little open. Great care must be taken that the patient is not in a draught, and this may be obviated, if necessary, by a judicious arrangement of screens.

The best way to admit air through the window is to place a piece of wood 4 inches high and the breadth of the window under the bottom sash, by which means the air will pass into the room up to the ceiling between the two halves of the window.

Relatives and friends must not be admitted unless the doctor gives permission, and following the operation the nurse must for some hours remain with the patient, so that if the nurse requires help she must summon it by bell.

Cleaning the Instruments.—This duty may have to be left for some little time, as the nurse will probably have to attend to the patient at first; meanwhile, if the surgeon wishes his instruments cleaned, the best plan is to put them into a basin and cover them with cold water.

When there is time to clean the instruments they should be well washed with cold water, soap, and soda to remove the blood-stains, after which, if necessary, they should be polished with some plate powder, and then again washed with hot water and scrubbed, all the joints being carefully examined to see that no *débris* is adhering to them; they should then be boiled for fifteen minutes. Lysol forms a very good medium in which to wash the instruments; it is of a soapy nature, antiseptic, and helps to polish them. A stream of water and a fine wire should be passed through the flushing curette, if one has been used, to remove any blood, and the instrument is then boiled, after which a little methylated spirit, or better still, ether, run through it will prevent any rust forming.

Cleaning the Gloves.—The gloves are scrubbed with soap and water, inside and out, then rinsed in clean water, boiled for ten minutes, and then dried with a towel and powdered with boric acid.

Temperature.—The temperature should be taken under the patient's tongue every four hours and charted. The temperature must never be taken just after the patient has had a hot drink, as this may raise it a degree. As a rule, in about eight hours after the operation the temperature rises to nearly 100° F. During the next twelve hours it keeps at this level, and then gradually falls to normal.

A subnormal temperature points to shock or bleeding.

A rapidly rising temperature, especially on the second day, is of very serious import, pointing as it may do to peritonitis being the cause, although in many cases with this complication the temperature remains subnormal if the disease is so rapidly fatal as to cause death in the first two or three days.

A persistent high temperature without any apparent cause is found on examination often to be due to a stitch abscess, or hæmatoma of the wound, while in cases in which the patient is very neurotic the temperature may rise for a few hours. In many instances a raised temperature will become normal after the bowels have been opened.

Respiration.—A rapid respiration rate soon after an abdominal section may be due to shock or hæmorrhage, and later an increase in its rate may be due to massive collapse of the lung, bronchitis, pneumonia, peritonitis or a pulmonary embolism.

The remarks under pulse, temperature, and respiration refer more particularly to patients after major operations. After minor operations the pulse, temperature, and respiration are as a rule normal.

Tongue.—For the first twenty-four hours after an abdominal section the tongue is generally dry and rather brown. After this it should be moist and rather white. In peritonitis and intestinal obstruction it becomes dry, brown, or red, glazed or ulcerated.

Bladder.—*Perineorrhaphy.*—After the operation the patient is encouraged to pass urine naturally. If she is unable to do so the catheter is passed twelve hours after the operation, and then if necessary every twelve hours.

Other Minor Operations.—There is no need for the catheter to be used.

Abdominal Section and Vaginal Hysterectomy.—The catheter is passed eight hours after the operation, and then, unless there is retention, it is not used, except in the case of vaginal hysterectomy when clamp-forceps have been left on, and then the catheter, which must be used with the greatest care for fear of disturbing the forceps, is passed every eight hours until they are removed.

The catheter should be used only when absolutely necessary, and then at regular intervals. Frequent passage of the catheter not only increases the risk of infecting the bladder, but also makes the urethra sore, and subsequent micturition painful. Moreover, patients quite easily get the “catheter habit” and, as a consequence, at times, appear unable to pass their urine naturally many days after catheterization has become quite unnecessary.

It is very important after major operations to measure the amount of urine passed and in every case to note any abnormal constituents in it, such as blood and pus. The amount first passed after a major operation should be 4 to 5 ounces; a less amount than this implies shock, hæmorrhage, suppression of urine, or injury to the ureter, and in the latter case, or in injury of the bladder, it may be mixed with blood. If, after an abdominal section, the patient is passing her urine naturally, and the amount is less than might be expected, the catheter should be passed at the end of micturition to make sure that there is no residual urine due to partial retention.

Bowels.—*Perineorrhaphy.*—On the fifth day following the operation a mild aperient (senna pods) is given, and thereafter as required.

Other Minor Operations.—On the second night following the operation the patient is given an aperient, and an enema the next morning if necessary, and then the bowels are kept acting as required.

Abdominal Section and Vaginal Hysterectomy.—On the evening of the third day after operation an aperient

is given. An aperient is then administered once daily if necessary.

Rectal Tube.—After vaginal hysterectomy and abdominal section it may be necessary to pass the rectal tube, and perhaps to give a turpentine enema or wash out. The indication for so doing is when the intestines become distended with flatus and the pain resulting therefrom is severe. Such distension, as a rule, does not occur before twenty-four hours after the operation, any flatulence prior to this being relegated to the stomach, and for which a rectal tube is of no use. When a patient is disturbed by intestinal flatus, the passage of a rectal tube once or twice will probably suffice. In some cases it may be necessary to pass it every four hours for a day or two. It has been observed that if the aperient is given two nights before the major operation, and thereafter the bowels are not interfered with, by enema or otherwise, it is very rarely necessary to use the rectal tube.

The rectal tube has to be passed very carefully, the end being first smeared with vaseline, as it so easily becomes kinked on itself when pushed into the bowel, and should this happen it must, of course, be taken out and passed again. The tube must be pushed as far as possible, using ordinary care; it will go farther in some patients than others, but an average distance is about 21 inches, the total length of the tube being 31 inches. There are various patterns of rectal tube; the best is one with the hole at the end, and not, like a catheter, at the side.

As a rule, very little discomfort is caused by passing the rectal tube, while when its use is indicated the relief to the patient is often very marked. Occasionally, however, if the patient has hæmorrhoids, great distress is caused by the passage of the rectal tube, and in these cases it is best to introduce a little gall and opium ointment some time before passing it.

Having introduced the tube as far as possible, it is kept position in as long as any flatus is escaping. If no flatus

passes the tube is left *in situ* for about five minutes, its free end being kept under Condly or mercury solution in a porringer.

Dressing.—*Perineorrhaphy.*—The successful termination of this operation depends probably more upon the nurse than anyone else, the reason for this being the great difficulty that is experienced in keeping the wound aseptic. Practically all the failures of this operation can be traced to the wound becoming septic and breaking down superficially. In the majority of cases when this happens a good result is still obtained, the wound healing by granulation, but the convalescence is prolonged and the discomfort to the patient much increased. In a few cases the wound sloughs, and the patient finds that after going through all the worry, pain, and perhaps expense, the operation has been a failure, and will have to be repeated.

The reason the wound is so difficult to keep aseptic is apparent when its situation is remembered, since it can be so easily contaminated with fæcal matter, urine, leucorrhœa, or the menstrual flow.

Most surgeons, unless there is an offensive discharge, do not order douching in these cases. The wound area is irrigated, whenever it is soiled with urine or fæces, and otherwise six hourly with some permanganate of potash solution poured out of a jug. Apart from this the wound is dressed twice daily. Flavine is a very good antiseptic to use for the dressing.

If any silk-worm gut sutures have been used they are removed on the twelfth day.

Removal of Cysts and Tumours from the Vulva.—The dressing is practically the same as for perineorrhaphy.

Trachelorrhaphy. — *Removal of Vaginal Cysts or Tumours.*—*Amputation of Cervix.*—If after these operations a piece of gauze is left in the vagina, it should be removed the next morning. The stitches are taken out on the twelfth day, unless catgut sutures have been used.

Curettage.—Many surgeons do not employ dressings after a curetting, other than those of a pad and T-bandage. If

tampons are inserted into the vagina, or the uterus has been packed with gauze, these are removed according to the directions given, generally on the following morning. If the nurse is directed to remove the gauze she must do so very gently, as otherwise a piece may break off and be retained in the uterus.

Vaginal Hysterectomy.—If, in vaginal hysterectomy, gauze has been inserted into the pouch of Douglas it is left there for thirty-six hours. After its removal the surgeon may order the nurse to cleanse carefully the lower part of the vagina every four hours with a swab of absorbent wool soaked in some antiseptic and held in a pair of ring forceps.

Supposing clamp forceps have been left on, the nurse must be very careful that the patient does not interfere with them, especially when recovering from the anæsthetic, and she must also be very careful when catheterizing or otherwise attending to the patient for fear of detaching them.

Abdominal Hysterectomy.—As a rule dressing, if used, need not be renewed until the seventh day, when the stitches or clips are taken out. A fresh supply of dry dressing must then be ready. If the surgeon wishes to strap the wound after the stitches or clips have been removed, some long strips of adherent plaster, about 2 inches broad and 12 inches long must be prepared.

If a rubber tube has been left in the abdomen for the purposes of drainage it will be necessary to change the dressings when they get soiled by the blood or discharge. The tube is, as a rule, removed on the day after the operation if it was used for oozing of blood, but if it has been inserted because of the presence of pus in the operation-site, or from the fear that the latter may become septic, then the time for its removal will vary according to the nature of the case. As a general rule it will not be disturbed for five days, after which it will be removed altogether, shortened, or reduced in size.

Douching.—The douches generally used are tincture of

iodine one drachm to a pint of hot water, biniodide of mercury, 1 in 4000, lysol or monsol one drachm to a quart.

Perineorrhaphy—Operations of the Vulva, Vagina, Cervix, and Curetting.—The custom of douching the vagina and vulva after these operations is becoming less usual. Many surgeons now deem it better to keep the wound dry and clean by swabbing with some antiseptic, unless the discharge becomes very offensive, when iodine douches will be ordered. If the surgeon requires his patient to be douched the nurse must ascertain how often this is to be done and what disinfectant is to be used. As a rule, twice a day is considered sufficient.

Vaginal Hysterectomy.—After vaginal hysterectomy, about the tenth day, the discharge in most cases commences to be offensive. This is due to some sloughing of the injured parts and separation of the ligatures. It is then customary for the surgeon to order a vaginal douche twice daily. If this is ordered it must be given with very gentle pressure, the douche-can being held but very little higher than the patient.

Abdominal Section.—After abdominal section douches are not ordered. In some cases after a total abdominal hysterectomy an offensive discharge will appear during the second week, due to separation of the ligatures. If so, the surgeon may order a vaginal douche.

Food.—*Perineorrhaphy.*—Eight hours after this operation the patient should be given 4 ounces of tea and milk or hot milk and water. The subsequent feeding depends on which day the surgeon orders the aperient, because, before this, ordinary liquid diet is prescribed. After the bowels have been well open the patient is given bread and butter, custard and sole, and quickly returns to ordinary diet.

Other Minor Operations.—Eight hours after the operation the patient is given 4 ounces of tea and milk or hot milk and water. The patient then returns to a normal diet.

Major Operations.—See next chapter.

CHAPTER XXVIII.

ABDOMINAL OPERATIONS.

Time-Table for Nursing and Feeding a Patient after an Abdominal Operation as used by the Author.

Hour.	DIRECTIONS.	NOURISHMENT.
	FIRST DAY.	
5 a.m.		Chicken-tea. Cup of tea, bread and butter, rusk or biscuit.
8.40 a.m.	Hypodermic injection of morphia gr. $\frac{1}{4}$, atropine gr. $\frac{1}{120}$, or scopolamine gr. $\frac{1}{160}$, atropine gr. $\frac{1}{120}$, heroin gr. $\frac{1}{2}$.	
8.45 a.m.	Catheter.	
9 a.m.	Operation. When the patient is returned to bed she must be covered with a warm blanket, and hot bottles should be removed from the bed, unless otherwise directed. A pillow should be placed under the patient's knees, a cradle over her abdomen, and her head is to be kept low. If retching or sickness supervenes the patient is to be turned slightly on her left side and her abdomen is to be supported by the nurse laying the flat of her hands on each side of the stitches.	If the operation is at 2 p.m. tea and bread and butter will be given at 6 a.m. and beef tea at 10 a.m. The catheter will be passed at 1.45 p.m. and the hypodermic injection at 1.40 p.m.

Hour.	DIRECTIONS.	NOURISHMENT.
2 p.m.	Pulse, respiration, temperature. If shock is present a rectal injection of saline solution with glucose \mathfrak{z} i, should be given every two hours, to which brandy may be added if necessary. If the patient is unconscious a pint of saline can be given. When conscious 6 to 10 ounces will probably be all she can retain. If the patient complains much of pain when she has recovered from the anæsthetic a rectal injection of aspirin gr. 20, in saline \mathfrak{z} vi, may be given.	
6 p.m.	Pulse, respiration, temperature. Pass a catheter if the patient has not passed her urine naturally and measure urine. Patient may have one or two pillows.	If there is little or no sickness drinks of cold water may be given as much as the patient desires.
FIRST NIGHT.		
8 p.m.	If the aspirin fails to relieve the pain, a hypodermic injection of morphia, gr. $\frac{1}{8}$, to be repeated if necessary, may be given. It is best if possible to postpone the administration of morphia till late in the evening, so as to ensure, if possible, the patient having a good night. Morphia should not be given after the first night, unless absolutely necessary, as it causes flatulence and is apt to mask important symptoms.	A cup of tea may be given, unless the patient prefers lemon water.
10 p.m.	Pulse, respiration, temperature.	
2 a.m.	Pulse, respiration, temperature.	

Hour.	Directions.	Nourishment.
	SECOND DAY.	
6 a.m.	Pulse, respiration, temperature.	
7 a.m. to 9 a.m.	The patient's hair to be brushed and plaited. Her hands, face, shoulders, and lower part of her back to be washed. The back and shoulders to be rubbed with eau-de-Cologne and boric powder. Mouth to be cleansed. Draw-sheet and top-sheet to be changed. The amount of nourishment taken, sleep obtained, and urine passed to be entered in the report book. If the patient passes only a small quantity of urine the catheter must be passed to ascertain if there is any residual urine, and if so the catheter must be used till practically all the urine is naturally evacuated.	Cup of tea and milk with a biscuit or bread and butter.
	The patient should be placed in Fowler's position unless there is any contra-indication.	
10 a.m.	Pulse, respiration, temperature.	During the day a glass of milk and soda or barley water or plain water may be given from time to time, as desired, or chicken-tea or beef-tea.
2 p.m.	Pulse, respiration, temperature.	
4 p.m.	During the second day flatulence may become troublesome and painful. It is at first felt in the	Cup of tea and milk with bread and butter.

HOUR.	DIRECTIONS.	NOURISHMENT.
	<p>stomach when small drinks of hot water with a few drops of essence of peppermint may relieve it. Later, as the intestine becomes distended, the flatulence is best relieved by passing the rectal tube to allow of the escape of flatus, and if this does not afford relief, a turpentine enema or rectal wash-out should be given before the rectal tube is withdrawn. These measures may be repeated if necessary every four hours.</p>	
6 p.m.	Pulse, respiration, temperature.	
7 p.m.	<p>The patient's hair to be brushed and plaited. Her hands, face, shoulders, and lower part of her back to be washed. The back and shoulders to be rubbed with eau-de-Cologne and boric powder. Mouth to be cleansed. Draw-sheet and top-sheet to be changed. The amount of nourishment taken, sleep obtained, and urine passed to be entered in report book.</p>	
	SECOND NIGHT.	
10 p.m.	<p>Pulse, respiration, temperature. Mouth to be cleansed.</p>	
11 p.m.	Turpentine enema. Aspirin gr. 10.	<p>Drinks of milk and soda or milk and barley water during the night if wished for.</p>
2 a.m.	Pulse, respiration, temperature, if patient is awake.	
	THIRD DAY.	
6 a.m.	Pulse, respiration, temperature.	

Hour.	Directions.	Nourishment.
7 a.m. to 9 a.m.	The patient's hair to be brushed and plaited. Her hands, face, shoulders, and lower part of her back to be washed. The back and shoulders to be rubbed with eau-de-Cologne and boric powder. Mouth to be cleansed. Draw-sheet and top-sheet to be changed. The amount of nourishment taken, sleep obtained, and urine passed to be entered in report book.	Cup of tea and milk. Bread and butter. Boiled egg, if patient would like it.
10 a.m.	Pulse, respiration, temperature.	Milk, beef-tea, or chicken broth.
1 p.m.		Fish, calf's-foot jelly or custard.
2 p.m.	Pulse, respiration, temperature. Mouth to be cleansed, wash hands and face.	
4 p.m.		Cup of tea and milk, bread and butter, jam or cake.
6 p.m.	Pulse, respiration, temperature.	
7 p.m.	The patient's hair to be brushed and plaited. Her hands, face, shoulders, and lower part of her back to be washed. The back and shoulders to be rubbed with eau-de-Cologne and boric powder. Mouth to be cleansed. Change draw-sheet and top-sheet. The amount of nourishment taken, sleep obtained, and urine passed to be entered in the report book. Aperient given.	Milk or soup.
THIRD NIGHT.		
10 p.m.	If the patient is progressing normally omit four-hourly temperature, respiration, and pulse, and take these only twice daily, morning and evening.	

Hour.	Directions.	Nourishment.
	<p>FOURTH DAY.</p>	<p>Drinks of milk, water or barley water during the night if wished for.</p>
6 a.m.	If the aperient fails to act and the patient is in pain, 1 c.c. of pituitary extract is injected.	
7 a.m. to 9 a.m.	The patient's hair to be brushed and plaited. Her face, hands, shoulders, and lower part of back to be washed. The back and shoulders to be rubbed with eau-de-Cologne and boric powder. Draw-sheet and top-sheet to be changed. The amount of nourishment taken, sleep obtained, and urine passed to be entered in report book.	Cup of tea and milk, bread and butter, boiled egg.
10 a.m.	Pulse, respiration, temperature.	Milk, beef-tea or chicken broth.
1 p.m.		Fish, custard pudding, piece of bread.
4 p.m.		Cup of tea and milk, bread and butter, jam, cake.
6 p.m.	Pulse, respiration, temperature.	
7 p.m.	The patient's hair to be brushed and plaited. Her face, hands, shoulders and lower part of back to be washed. Her back and shoulders to be rubbed with eau-de-Cologne and boric powder. Draw-sheet, top-sheet, and bottom-sheet to be changed. The amount of nourishment taken, sleep obtained, and urine passed, and the number of times the bowels have acted to be entered in report book.	Rabbit, chicken or mince, custard pudding, bread or biscuit.

Hour.	Directions.	Nourishment.
	FOURTH NIGHT.	
		Drinks of milk, water or barley water during night if necessary.
	FIFTH DAY.	
7 a.m. to 9 a.m.	The patient's hair to be brushed and plaited. Her face, hands, shoulders, and lower part of her back to be washed. Her back and shoulders to be rubbed with eau-de-Cologne and boric powder. Mouth to be cleansed. Draw-sheet, top-sheet, and bottom-sheet to be changed. The amount of nourishment taken, sleep obtained, and urine passed, and the number of times the bowels have acted to be entered in report book.	
8 a.m.		Cup of tea and milk, bread and butter, boiled egg.
10 a.m.	"Michel's" clips to be removed and the abdominal wound to be then painted with the iodine solution, if this was used in the first instance. If dressings have been used, these to be renewed. Pulse, respiration, temperature.	
1 p.m.		Lunch.
2 p.m.	Mouth to be cleansed. Wash hands and face.	
4 p.m.		Tea.
6 p.m.	Pulse, respiration, temperature.	
7 p.m.	The patient's hair to be brushed and plaited. Her face, hands, shoulders, and lower part of her	Dinner.

Hour.	DIRECTIONS.	NOURISHMENT.
7 a.m. to 9 a.m.	<p>body to be washed. Her back and shoulders to be rubbed with eau-de-Cologne and boric powder. The patient may be lifted into another bed or sofa while her mattress is being turned. Draw-sheet and top-sheet to be changed. Mouth to be cleansed. The amount of nourishment taken, sleep obtained, and urine passed, and the number of times the bowels have acted to be entered in the report book.</p>	
	<p>FIFTH NIGHT.</p>	
	<p>The patient's hair to be brushed and plaited. Her face, hands, shoulders, and lower part of her body to be washed. Her back and shoulders to be rubbed with eau-de-Cologne and boric powder. Draw-sheet and top-sheet to be changed. Knee-pillow to be removed. The amount of nourishment taken, sleep obtained, and urine passed, and the number of times the bowels have acted to be entered in report book.</p>	
	<p>SIXTH DAY.</p>	
	<p>The pulse, respiration, and temperature are to be taken twice daily, and the patient is attended to as before.</p>	<p>Diet as before, and mutton may be substituted for chicken.</p>
	<p>SEVENTH DAY.</p>	<p>For this and the following days the ordinary diet may be renewed.</p>

Hour.	Directions.	Nourishment.
	<p>TENTH DAY.</p> <p>If silk-worm gut retaining through-and-through sutures have been used, they should be removed on this day.</p> <p>FOURTEENTH DAY.</p> <p>Patient is lifted on to a couch.</p> <p>FIFTEENTH DAY.</p> <p>Patient may walk about, and have a bath.</p> <p>EIGHTEENTH DAY.</p> <p>Patient goes home.</p>	

This table is meant to serve as a guide only in normal cases, and the nurse should always ascertain from the surgeon how he wishes his patients to be treated after the operation.

If post-anæsthetic sickness is troublesome, nourishment will have to be given more cautiously or even withheld for a time.

Belts.—Many surgeons prefer their patients to wear abdominal belts, for some time after they get up. Other surgeons never advise their use. It is doubtful whether the use of an abdominal belt lessens the chance of a ventral hernia supervening, since as many ventral herniæ occur in patients who wear belts as in those who do not. Some patients, however, feel more comfortable with such a support. In such cases a properly fitting pair of corsets is probably better than a belt.

Getting Up.—After abdominal operations or vaginal hysterectomy, the patient may get out of bed on the fourteenth

day and leave the nursing home or hospital on the eighteenth. If the patient has suffered from much loss of blood before the operation or has otherwise been ill it will be wiser to keep her in bed a month.

After the operation of colpo-perineorrhaphy the patient may get up on the eighteenth day.

After other minor operations the patient may get up on the seventh day and leave on the tenth.

CHAPTER XXIX.

NURSING OF COMPLICATIONS.

THE nurse should report any complication occurring after an operation to the doctor as soon as possible.

The most common complications met with after an abdominal section are: thirst, pain, sleeplessness, vomiting, and distension. Among the rarer complications are shock, hæmorrhage, peritonitis, intestinal obstruction, cystitis, venous thrombosis, pulmonary embolism, and those relating to the abdominal wound.

Thirst.—This is a very distressing symptom, and the following methods may be tried for its relief. The mouth may be swabbed out with hot water or glycerine and borax. The patient may be allowed to wash her mouth out with hot water or a weak solution of Condy's fluid. Saline injections into the rectum, 6 ounces every four hours, will relieve the thirst to a great degree. Hot or cold tea, with or without milk, will often relieve thirst, as also will vinegar and water, \mathfrak{z} i to \mathfrak{z} vi, which encourages the flow of saliva. The practice now followed by the author of allowing his patients, after operation, to drink as much water as they desire has been found to abolish in most cases the troublesome symptom of thirst.

Sucking ice is not a good remedy; in most cases the relief is only momentary, the thirst increases, and flatulence results.

Pain.—Patients complain of pain in their back and abdomen on the night of the operation. This is due principally to the arching of the back resulting from the Trendelenburg position, and can be to some extent obviated by placing a pillow under the small of the back when the

patient is in the Trendelenburg position. The pain can also be relieved by inserting a pillow under the legs of the patient when she is returned to her bed, which procedure allows the back to lie flat on the bed, and not arched, as is otherwise the case. Pain in the back can also be relieved by placing a small air-cushion or pad under it, and by allowing the patient to lie on her side, but most patients having tried this position prefer the dorsal one.

The surgeon will probably leave directions that if, in the early hours after the operation, the pain becomes unbearable, 20 grains of aspirin in 6 ounces of saline are to be given per rectum. Later, and during the night, an injection of morphia may be necessary. It is a better plan to give two small doses, say $\frac{1}{6}$ grain at intervals, than one large one, as the second dose may not be required. If morphia is known to disagree, an injection of heroin, $\frac{1}{2}$ grain, can be given in its stead. After the first night morphia is contra-indicated, since it favours distension, and masks peritonitis and obstruction. The following mixture, given per rectum, is in most cases very efficacious and may be repeated in four hours if necessary:—

Potassium bromide, grains 30 ; aspirin, grains 20 ; brandy $\frac{3}{4}$ ss., saline solution, $\frac{3}{4}$ vi.

In some cases when the patient is very neurotic, throwing herself about and complaining of the greatest agony, although an examination shows that the temperature and pulse are normal, and that distension and sickness are absent, an injection of $\frac{1}{3}$ to $\frac{1}{2}$ grain of morphia is of the greatest value, and will quiet her at once.

Sleeplessness.—It will depend upon the effect of the morphia injection what amount of sleep the patient gets the first night. Some patients sleep several hours at a stretch, others for short periods at a time only, although they may not be in much pain. After the scopolamine, atropine, and heroin injection given before the anæsthetic, patients will often sleep well on into the afternoon following their operation. For sleeplessness after the first night, trional or aspirin is often a satisfactory remedy.

Vomiting.—This may be due to the anæsthetic, to gastritis, to neurosis, to peritonitis, or to obstruction of the bowels.

Anæsthetic Vomiting.—This comes on early, and lasts, as a rule, about twenty-four hours. It is very often more of a trying to be sick than actual vomiting, and in many cases appears to be made worse by the smell and taste of the anæsthetic. The patient retches a good deal, and when she does bring up anything it is only a small quantity, a drachm or so at a time, and light green in colour. There is no tenderness of the abdomen, no fever, or increase in the pulse-rate. It is often associated with flatulent distension. It may be treated by making the drinks colder or hotter, by peptonizing the milk, or by giving a draught containing—

R \bar{y}	Bicarbonate of soda	1 drachm
	Essence of peppermint	5 minims
	Warm water	10 ounces

which generally makes the patient very sick, and so really washes out the stomach. Other remedies are a minim of tincture of iodine in a drachm of water every half-hour or so, pine-apple juice, very strong coffee, or an ice bag to the epigastrium. Inhalation from a handkerchief wrung out of pure vinegar is, in many cases, very comforting.

If these remedies fail, the condition can always be cured by putting the patient on rectal feeding for a few hours.

Another method of treatment is to wash out the stomach. If the surgeon elects to do this the nurse must prepare 2 or 3 quarts of boric or saline solution at a temperature of 105° F., as the solution will be used until it returns quite clean.

Irritative Vomiting.—This is due to gastritis set up by the anæsthetic. Although the stomach rejects anything that is put into it, if it is left alone vomiting is not so likely to occur. Irritative vomiting is often associated with gastric flatulence. It is best treated by withholding all food by the mouth for some hours and giving saline injec-

tions in its stead. A soap and water enema will at times stop this variety of vomiting at once. As a rule irritative vomiting does not last more than twenty-four hours. The pulse-rate and temperature are normal and there is no abdominal tenderness.

Neurotic Vomiting.—The patient is continually retching, whether there is anything in her stomach or no; she appears to be trying to be sick. An examination of the pulse-rate, temperature, and abdomen fails to disclose any abnormal condition. Neurotic vomiting, which may last for some days, is often accompanied by complaints of great agony and by excitement and lack of sleep. The various remedies already mentioned may be tried, and in very excitable patients an injection of $\frac{1}{3}$ grain of morphia will often prove to be the most successful remedy.

Peritonitic Vomiting.—This comes on during the second or third day, the ejected fluid is dark green or brown in colour, and sometimes offensive, while the amount may be very considerable, the patient vomiting as much as half a pint at a time. With it there is no feeling of sickness or effort to eject the vomited fluid as in the irritative vomiting; the fluid simply wells up and runs out of the mouth. The other signs and symptoms which accompany peritonitis are also, as a rule, so evident that no mistake can be made of the significance of this variety of vomiting.

Obstructive Vomiting.—This is due to some portion of the gut having become accidentally included in a ligature during the operation or to adhesions forming among the intestines or omentum after the operation, or to the gut becoming adherent to the stump in a hysterectomy.

This variety of vomiting, which comes on gradually at first and only at intervals, continues to increase in frequency, till at the last it is practically continuous. Although fæcal vomiting is said to be diagnostic of it, the ejected material often does not become fæcal in character till the end is at hand, and on many occasions it does not become fæcal at all.

Obstructive vomiting is always accompanied by distension, which gradually becomes more and more marked,

commencing, as a rule, over the left abdomen, as it is here, in the region of the sigmoid flexure, that the obstruction generally takes place.

The treatment of these last two varieties of vomiting will be that of the cause.

Abdominal Distension.—Propping the patient in Fowler's position often relieves distension, and unless the contrary is ordered the nurse should always place the patient in this position the morning after the operation.

Gastric Distension.—This is due to the irritation of the anæsthetic, and may be treated by the administration of essence of peppermint \mathfrak{m} 5, in water \mathfrak{z} ii; ol. cajuput \mathfrak{m} iii on a lump of sugar, or by placing a hot-water bottle on the epigastrium.

Intestinal Distension.—Paretic distension is not an uncommon condition, especially when the operation has been at all prolonged and there has been much handling of the intestines. The distension, which is due to loss of tone in the bowel-walls, is uniform and soft; there is no tenderness or rigidity of the abdominal walls, and unless the distension becomes very marked there is no alteration in the pulse-rate or temperature. If this variety of distension gets very bad and is not relieved the patient may die. It may be treated by the frequent use of the rectal tube, by a turpentine, ox gall, or rue enema, by a rectal wash-out, or by a rectal injection of an ounce of essence of peppermint in a pint of water.

Paretic intestinal distension is also, in many cases, very successfully treated by injections of pituitrin $\frac{1}{2}$ c.c. or by eserine grain $\frac{1}{100}$ with strychnine grain $\frac{1}{60}$, every four hours.

Turpentine enema:—

A good recipe for a turpentine enema is that used at the Middlesex Hospital:—

Turpentine	.	.	.	.	.	.	.	$\frac{1}{2}$ ounce
Castor oil	.	.	.	.	.	.	.	1 ounce
Soap and water	.	.	.	.	.	.	.	$\frac{1}{2}$ pint
Water and gruel	.	.	.	.	.	.	.	$\frac{1}{2}$ pint

It is made as follows, the enema being injected as warm as possible: Either by mixing the turpentine in a porringer with a piece of soft soap as large as a hen's egg, then stirring in the oil, and adding the remaining ingredients last, or by beating up the turpentine with the white of an egg, and then stirring in the ingredients.

Rue enema :—

Oil of rue	20 minims
Mucilage of acacia	2 drachms
Soap and water to	6 ounces

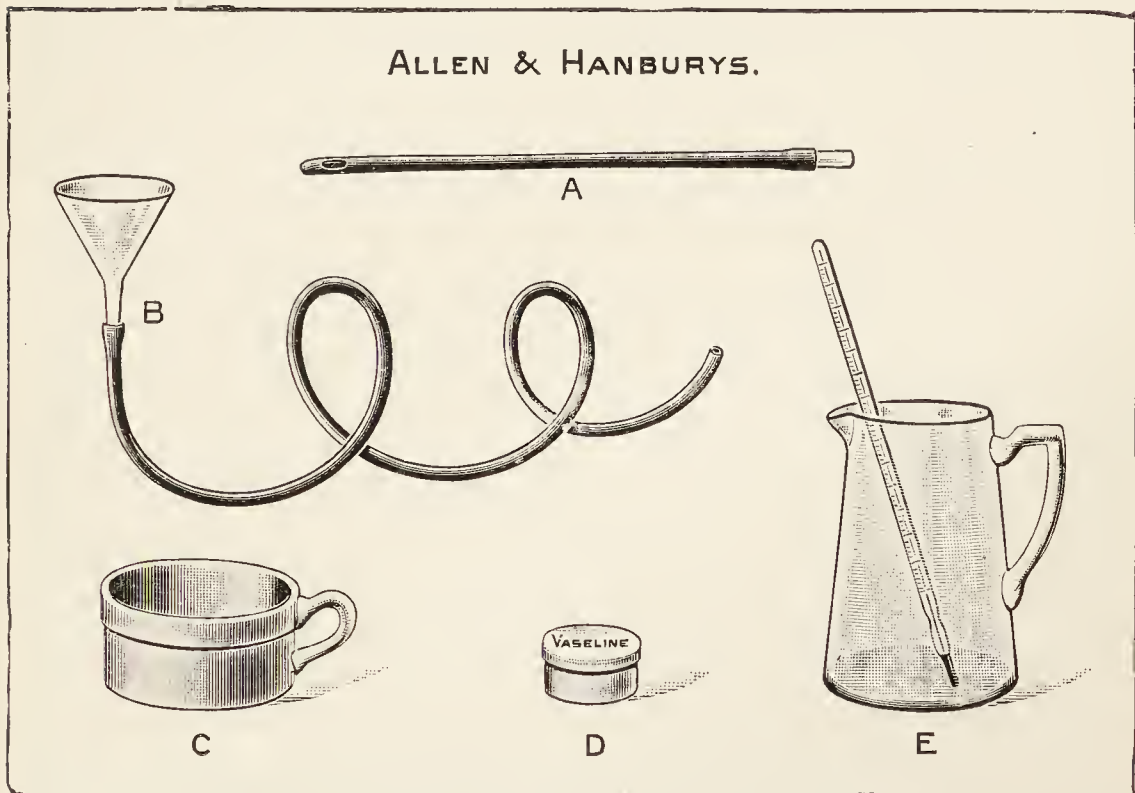


FIG. 70.—Apparatus for giving a rectal wash-out.

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|--|-----------------------------|
| A. India-rubber catheter and glass joint. | B. Glass funnel and tubing. |
| C. Porringer for swabs. | D. Vaseline. |
| E. Glass or enamel measure with thermometer. | |

In either case if the enema is not returned the rectal tube is passed to draw it off.

Ox gall solution enema :—

Six ounces of ox gall solution heated by placing the bottle containing it in hot water, and then injecting the ox gall into the rectum, often affords great relief.

Rectal Wash-out.—To give a rectal wash-out a catheter with a glass funnel and tubing fitted to its end by a glass joint are required. It is important before inserting the tube to drive out of it the air. Some of the fluid therefore should be run through the tube which should then be pinched just below the glass funnel, before the latter is quite empty. Two pints of soap and hot water containing 1 ounce of turpentine are then made up, and 6 ounces of this solution are poured into the funnel, which is held as high as possible. The solution is then allowed to remain in the rectum for a few minutes, after which the funnel is lowered into a basin of water and the solution allowed to run out with a consequent aspiration of flatus from the intestine. This is repeated till the 2 pints are used up. It is important that a siphonage action should be established, by not emptying the funnel before it is lowered to withdraw the bowel contents. As a rule, this method of treating the distension is very successful (Fig. 70).

Peritonitic Distension—There is great abdominal pain, the walls are very rigid, and the patient soon becomes collapsed. As a rule treatment is of no avail, but rectal wash-outs and enemas afford the best means of relief. Patients suffering from this form of distension will often pass flatus with the tube, but not naturally, till the end.

Obstructive Distension.—This distension cannot be relieved until the obstruction is relieved.

A word of warning is here necessary concerning the method of giving a rectal enema for any purpose. The nurse should never insert the bone nozzle of the enema syringe into the rectum, but should attach the india-rubber tubing provided for this purpose to the bone nozzle first. The neglect of this simple precaution, due to sheer carelessness, has resulted, more often than has been reported, in the bone nozzle being forced through the lower end of the rectum and the douche being pumped into the cellular tissue around it until the great pain experienced by the patient forces the nurse to desist. The author lost a patient in these circumstances, when she was convalescent.

Shock—Hæmorrhage.—These two complications will be dealt with together because to the inexperienced eye there is a certain resemblance between them, and even the trained observer may occasionally be in great doubt as to which of the two the patient is really suffering from, especially when much blood has been lost at the operation, since such a loss is itself a cause of shock. A great responsibility devolves upon the nurse, however, with respect to these two conditions, since she will have the first opportunity of diagnosing them, and her failure to send for the surgeon when the patient is bleeding may result in the patient's death, whereas by an early intimation many a life has been saved.

It will be better to take the signs separately and compare them.

Shock.

Signs date from the operation.
Signs tend to get better.
Face may be blanched.

Pulse-rate fast, 140, may at times be slow.
Patient is quiet.
Respirations are quick and shallow.

Does not as a rule feel faint.
Brandy enemata improve shock.

Abdominal pain absent.
Temperature may be subnormal.
Duration and severity of the operation of special significance.

Hæmorrhage.

Signs develop after the operation.
Signs tend to get worse.
Face and lips are markedly blanched.
Pulse-rate fast, 140, and feeble.
Fast pulse nearly always.
Patient is very restless.
Respirations are sighing and gasping.
Always feels faint.
Brandy enemata increase hæmorrhage.
Severe abdominal pain.
Temperature as a rule subnormal.
Duration and severity of the operation of no special significance, unless it was known that much blood had been lost.

TREATMENT.—

In cases of shock, hot-water bottles, or an electric cradle, an enema containing 1 ounce of brandy and 10 ounces of hot saline, and a hypodermic injection of strychnine gr. $\frac{1}{60}$, will be of great service, and may be repeated if necessary. If the patient does not improve with these measures, a saline

infusion of two or three pints should be at once administered. In cases of hæmorrhage the only treatment which is of any avail is for the bleeding point to be exposed and tied.

While the surgeon is operating, the nurse, if she has not done so before, will have to get ready the saline solution for infusion or injection. *If the nurse suspects hæmorrhage she should never stimulate the patient.*

The shock is due to irritation of the sympathetic nerves during the operation, or to loss of blood, or both.

General Peritonitis.—This, the most frequent cause of death after abdominal section or vaginal hysterectomy, is caused by septic infection of the peritoneum. This may be due to some flaw in the aseptic technique, and on the occurrence of peritonitis the strictest inquiry must be made into the various details connected with the operation in order that the source of the infection may, if possible, be discovered, and so danger, in this respect, to other patients undergoing operation prevented.

Every case of peritonitis, however, is not due to faulty technique. It may be that the abdominal tumour is already infected before an operation for its removal takes place, or during the operation some pus, which has been locked up in an abscess, may be disturbed and soil the peritoneum.

The appearance of general peritonitis is gradual, and, as a rule, the symptoms and signs do not become marked until the third day. It will be noticed that the pulse-rate does not fall in the usual way but continues to rise so that it reaches 120 or over. The temperature in most cases rises rapidly. The respirations increase and the tongue becomes dry. Vomiting now supervenes, the vomited matter, which is green or dark brown in colour, being ejected without any effort or feeling of nausea. The amount vomited at a time may be considerable and the stomach cannot tolerate any solid or liquid. With the vomiting there is associated marked abdominal distension, the walls of the abdomen are extremely rigid and it is greatly tender. The patient complains of agonizing pain,

and lies with her legs flexed to relieve the pain caused by tension of the abdominal muscles when the legs are straight. There is, as a rule, constipation, the breathing is thoracic, and hiccough is often troublesome from the first. In very rapid and fatal cases the temperature may fall to below normal, and there is no pain or tenderness to speak of.

There are many channels by which sepsis may infect a patient, but it has been proved over and over again that the greater the care that is taken in making everything connected with the operation as aseptic as possible, so much the less chance will there be of peritonitis supervening; in fact, peritonitis, from being in the past the commonest complication seen after abdominal section, has nowadays become probably the rarest.

Intestinal Obstruction.—Intestinal obstruction after an abdominal section may be due to adhesion of a loop of intestine to the pedicle remaining after the removal of a diseased ovary or Fallopian tube, or to the stump of a hysterectomy. A piece of intestine may be included in a ligature. Some other causes are adhesions forming between different portions of intestine or between intestine and the omentum, and a knuckle of intestine forcing its way through the fascial incision and remaining undetected.

A patient suffering from intestinal obstruction has colic and intermittent pain of great severity, which is more particularly aroused by abdominal palpation, or eating and drinking. The pain most often starts in the left iliac region, as this is the commonest site of the obstruction. The abdominal muscles are rigid, there is marked abdominal distension, and palpation often excites intestinal movements. Although in the early stages flatus may be passed by the rectal tube, this soon ceases. The patient will vomit quite apart from taking anything into her stomach or not, though she may retain food for several hours before returning it. Towards the end the vomiting is continuous. The vomit becomes brown and in some cases is fæcal. The pulse-rate is markedly quickened, as a rule there is no fever but the temperature may be subnormal.

Cystitis.—About the end of the second week after vaginal hysterectomy or abdominal section the patient may complain of pain on micturition. The urine in such cases may be found to be acid and to contain a little pus. Large drinks of lemon or barley water should be given and salol, or urotropin in doses of 10 grains, with acid sodium phosphate 30 grains and water to an ounce three times a day, will, as a rule, soon cure this form of cystitis due to infection with the colon bacillus. The urine may, however, be alkaline and ammoniacal, in which case the cystitis will have to be treated by washing out the bladder (see page 274).

Femoral Thrombosis.—About the thirteenth day after the operation the leg becomes swollen and very painful. The swelling may be limited to the lower part of the leg or the whole leg may be affected. This swelling pits on pressure, and a hard, tender lump can be felt in the femoral vein.

There is, as a rule, tenderness over the femoral vein, and because of the pain the patient is unable to move the leg. The temperature will be somewhat raised. The leg generally remains in this condition for a few days, and then gradually gets better, although in some cases it remains permanently swollen.

Femoral thrombosis may occur after any operation, and, as a rule, the left leg is affected.

The surgeon will direct the nurse to paint the leg with a solution of glycerine and belladonna, and to apply over this a warm fomentation, and a bandage. The leg should be rested on a pillow, a cradle put over it, sand-bags should be placed each side, while the nurse will be directed to see that the patient does not move her leg, and that it be kept perfectly at rest. The great danger of femoral thrombosis is that the clot in the vein or part of it, on account of some movement, may get loose and escape into the circulation, causing pulmonary embolism.

Pulmonary Embolism.—This condition is due to the detachment of a clot of blood (thrombus) from some vein into the circulation. The clot is then carried to the heart and may block the blood-vessel through which the blood is

sent to the lungs to be aerated. This complication is known as a pulmonary embolism. If the pulmonary artery is entirely blocked the patient dies practically suddenly. If partially blocked, death may be slower, or the patient may recover. If death is not sudden the patient experiences the greatest difficulty in respiration. She will sit up in bed, gasp, struggle to get her breath, throw her arms about, and the colour of her face, at first blue, gradually becomes grey. The nurse should administer brandy, and oxygen if any is available, and a hypodermic injection of morphia gr. $\frac{1}{4}$ to relieve the distress. If the patient stops breathing, artificial respiration should be performed.

Complications of the Abdominal Wound.—The abdominal wound may be the seat of a hæmatoma or of an abscess. It may slough, it may be the seat of a sinus, and rarely it may burst.

Hæmatoma.—A hæmatoma will lead to a certain amount of tenderness, and the temperature will be irregular, without the patient being otherwise apparently ill. If abdominal dressings have been used this complication is generally discovered when they are removed, at the end of the week.

Depending upon the size of the hæmatoma the surgeon may decide to leave it alone or may open the wound, scrape the blood-clot out, re-suture it, or apply an antiseptic dressing.

Abscess.—An abscess of the abdominal wound is generally due to an infected suture or ligature, or to infection of a hæmatoma. It may declare itself in a few days, or not perhaps for months later. Pain and tenderness, a rise of temperature, redness and swelling at some spot along the site of the wound are its leading symptoms.

Sloughing.—Occasionally, especially if the operation has been a long one and the retraction of the abdominal wall has been prolonged, and virulent bacteria are present in the tissues removed, such as occurs in cancer of the uterus, the whole of the abdominal incision will slough. Such a complication is more likely if the resisting power of the patient has been lowered by a severe illness. A high

temperature and pain in the region of the wound will lead to its examination. Part of the muscle layer often sloughs and the discharge is extremely offensive. Such a condition will require hot fomentations, together with frequent irrigation with a disinfectant (of which peroxide of hydrogen, 10 volumes, will do very well), till the wound is clean, after which it must be dressed as the surgeon directs.

The dressing is best kept in place, and the facility with which the wound can be dressed is greatly increased, by

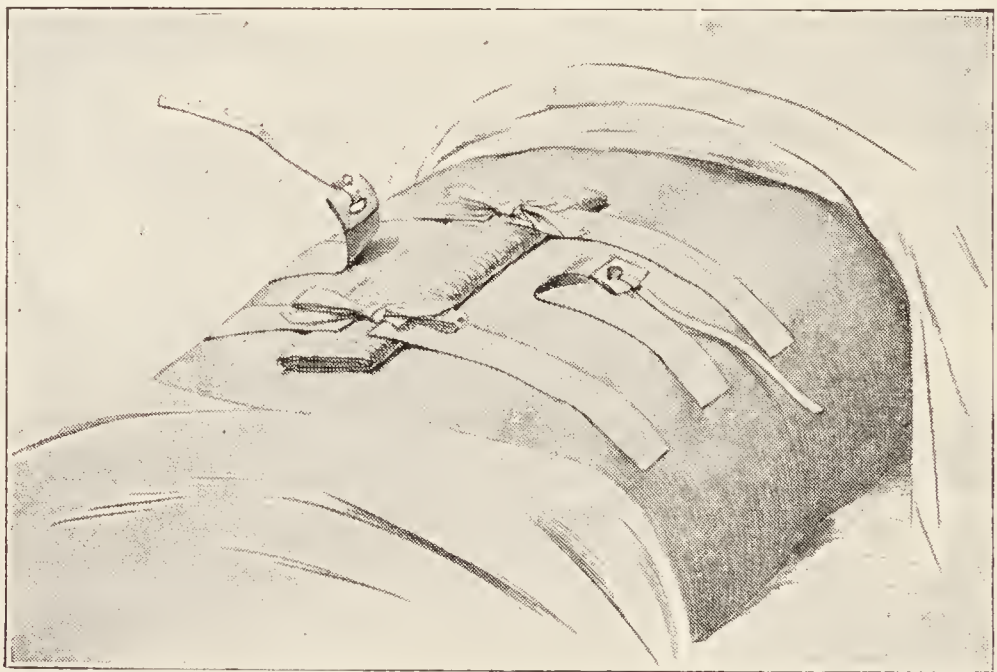


FIG. 71.—ARRANGEMENT OF PLASTER AND TAPES.

Note the free end of the tape turned inwards to prevent it sticking to the dressing and also to form a firmer attachment for the tape.

the use of tape and plaster. Pieces of strapping 5 inches long by 1 inch broad should be cut and a tape $\frac{1}{4}$ inch broad should be sewn to one end of each. The strapping is then applied to the abdominal wall so that the end the tape is attached to reaches not nearer than 2 inches from the edge of the wound. About six pieces of strapping thus prepared will be required, three on each side. After the wound has been dressed, its edges can be approximated and the dressing kept in place by tying each piece of tape to the corresponding piece on the opposite side. (Fig. 71).

Sinus.—A sinus of the abdominal wound may be due to an infected suture or ligature, to the track made by a drainage tube, or to the result of a fæcal or ureteric fistula. The two latter complications occur towards the end of the second week, and are preceded, as a rule, by a rise of temperature. In most cases the fæcal fistula closes in a short time but the sinus may remain for months, and rarely, without further treatment, it remains permanent. The ureteric fistula rarely closes.

Bursting.—This is an alarming complication and is generally due to violent fits of retching, vomiting, or coughing. Occasionally the only cause that can be surmised is, when catgut has been used, that of a too rapid absorption of the parietal sutures.

Either part of the wound or the whole wound may burst. Partial bursting may not occasion any symptoms at first, and it is not until the pulse-rate rises and abdominal pain is complained of, that the abdominal dressings are removed and a coil of intestine, perhaps partly strangulated, is detected. When the whole wound bursts the patient has a sudden and severe pain and suffers from shock. It is peculiar how often partial bursting of the wound is overlooked in the first instance.

The surgeon will have to clean the intestine, replace it, and re-suture the wound. Fortunately the patients nearly always do well, the fatalities being due to the intestine escaping through the fascial edges of the wound only and then becoming strangulated before the accident is recognized.

Special Points in the Nursing of a Patient after the Radical Operation for Carcinoma of the Cervix Uteri.

The radical operation for cancer of the neck of the uterus is in most cases more trying to the patient than any other operation concerned with diseases peculiar to women. Indeed, this operation, in an advanced case, is as serious to the patient, and as difficult to perform, as any operation in surgery.

Great responsibility devolves on the nurse who has charge of such cases; the care of a thoroughly trained and efficient nurse may mean the difference between life and death to the patient.

The following are the chief points to be remembered by the nurse in attendance:—

Shock.—Shock is often considerable and at times very marked. This is due, not only to the severity of the operation, but also because in most instances the health of the patient has already been affected by pain, bleeding, and a septic discharge. In addition many of the patients are past middle age.

The usual means of combating shock are to raise the foot of the bed on blocks, to place an electric cradle over the patient, and to inject camphor, gr. 30.

Infection of the Bladder.—During the operation the posterior surface of the bladder has to be stripped from its attachments. This means that its nerve supply is injured and so, for one or two weeks, the patient is unable to empty her bladder completely, and many of the patients have retention. Because of this incomplete emptying of the bladder, and because of the injury to the blood supply, the bladder is very likely to become infected. Most patients suffer from a little cystitis.

The retention of urine is treated as follows: For the first 24 hours the catheter is passed four hourly. For the second 24 hours it is passed six hourly. For the third 24 hours, and thereafter till the urine is passed naturally, every eight hours. As a rule the urine is not passed naturally for 14 days, and in some cases not until the patient is up. In addition the patient is given a hexamine mixture till her discharge.

Infection of the Abdominal Wound.—In a certain number of cases the abdominal incision does not heal in the usual way, generally a little local suppuration appears—more rarely about the fourth day after the operation a very offensive brownish discharge escapes from the bottom of the wound. On the doctor separating the skin, the muscle,

fat, and fascia will be found to be sloughing. This serious complication, due to the wound being infected by bacteria, results in the patient becoming toxic.

The wound is treated with hot fomentations till it is clean, combined with a dressing twice daily of peroxide of hydrogen or eusol. In most cases a binder should be used till the wound is clean, after which strapping.

Diarrhœa.—In certain cases, and this has been noticed particularly when a strong aperient has been given after the operation, the patient suffers from distressing diarrhœa and a certain amount of incontinence of fæces.

This complication may usually be prevented by giving as the aperient syrup of figs. If diarrhœa supervenes it is best treated with a mixture of bismuth and opium.

Infection in the Pelvis and of the Remains of the Vagina.—As regards the pelvis it is not surprising that sepsis, in the region from which the growth has been removed, should occur. A nurse who has seen this operation will remember that the pelvis has been stripped of everything except its muscles, large blood-vessels, important nerves, and the bladder and rectum. A large cavity is thus formed into which the remains of the vaginal canal opens. At the back of this cavity is the raw surface of the front of the rectum, in front is the raw surface of the back of the bladder, and the floor of the cavity is raw. Bacteria from the rectum or from the vaginal canal invading this cavity can thus easily infect it. The remains of the vaginal walls may slough badly, and in these cases it has been noticed that there has always been a bad vaginal discharge or urinary fistula. The signs usually appear about the fifth day with fever, and a foul discharge. The suppuration generally lasts some time, but usually clears up in a month. Rarely the patient succumbs in an intense toxic condition, and very rarely one of the large blood-vessels in the pelvis is opened by suppuration and the patient dies quickly of hæmorrhage.

Incontinence of Urine.—This complication results from

sloughing of, or injury to, the ureter or from sloughing of, or injury to, the bladder. In advanced cases the ureter has, at times, to be dissected from the side of the growth, and in every case two or three inches of ureter have to be isolated to enable the operator to get clear of the cancerous tissues. It is not surprising, therefore, that at times the ureter sloughs since its blood supply has been interfered with. If the ureter is injured or sloughs, urine is found to be escaping by the vagina, generally about the tenth day. Likewise the bladder may be injured when it is dissected off the growth, or it may become infected and slough. In the first instance, if the repairing stitches do not hold, or in the second, if the bladder sloughs, a vesico-vaginal fistula results.

The treatment of such a complication requires constant attention. The patient will be much more comfortable if she sits upright on an india-rubber ring and is given baths twice daily, boric lotion douches, and an ointment of zinc ointment and castor oil is applied to the parts over which the urine travels.

The fistula may heal in due course, failing which the patient may be cured by operation or have to use an appliance for the rest of her life. The operations on the ureter consist of implanting the free end of the ureter into the bladder, or, if this is impossible, the corresponding kidney has to be removed.

GLOSSARY.

(NOTE.—In the derivations, the Greek words are given in English spelling. Vowels, “a,” “e,” “i,” “o,” have been marked with signs indicating short or long sounds, where this seemed necessary as a guide to pronunciation, *e.g.* in “*ācinus*” the “a” is short as in “man,” while in “*cāro*” it is long as in “name”: “*ě*” represents the sound of “e” in “set,” “*ē*” the sound in “scene”: “*ī*” as in “hit,” “*î*” as in “mind”: “*ö*” as in “lot,” “*ō*” as in “tone.”)

Acinus. (L. *ācinus*, grape.) The smallest lobules of a compound gland, *e.g.* the breast; also a dilatation forming the end of a small passage, *e.g.* air sacs of lungs.

Adenomyoma or **Endometrioma.** (G. *adēn*, gland; *mus*, muscle; *-ōma*, tumour.) A tumour composed of glandular and muscular tissue.

Adhesion. (L. *adhærēre*, to stick to.) The joining together of parts which normally should not be joined.

Amenorrhœa. (G. *a*, no; *mēn*, month; *rhoia*, flow.) Absence or abnormal cessation of the periods.

Amnion. (G. *amnion*, lamb.) The inner of the two foetal membranes.

Amœba. (*amoibē*, change.) A protozoon.

Ampullary. (L. *ampulla*, a jug.) A dilatation like a flask. Ampullary layer, the dilated glands forming part of the decidua.

Anæmia. (G. *an*, no; *haima*, blood.) A condition in which the blood is deficient in hæmoglobin or in the number of red blood corpuscles.

Anaphylaxis. (G. *ana*, against; *phulaxis*, protection.) A condition of super-sensitiveness produced by a first injection of serum which lowers the immunity of the person injected.

Anti-bodies. Substances secreted by the cells of the body to protect itself against the results of bacterial infection.

Ascites. (G. *askos*, bag.) A collection of serous fluid in the peritoneal cavity.

Atresia. (G. *a*, no; *trēsis*, boring.) Absence or closure of a normal opening, *e.g.* of the cervical canal.

Atrophy. (G. *a*, no; *trōphē*, nourishment.) A wasting or diminution in the size of a part, defect or failure of nutrition.

Bacteriolysin. (*bacteria*: G. *lusi*, dissolution.) An anti-body which shrinks, or breaks up, bacteria.

Bacterium. (G. *bacterion*, a little rod.) A single vegetable cell belonging to the lowest form of life.

Blastocyst. (G. *blāstos*, germ; *kustis*, cyst.) The developing zygote.

- Cachexia.** (G. *kākos*, ill; *hexis*, habit.) State of marked ill-health or malnutrition.
- Capsule.** (L. *capsula*, little box.) Supra-renal capsule, a small organ on anterior upper surface of kidney.
- Carious.** (L. *cariōsus*, rotten.) Dental caries, damage to enamel and dentine of teeth by acid-producing bacteria.
- Caruncle.** (L. *caruncula*, diminutive from *cāro*, flesh.) A small fleshy eminence, *e.g.* urethral caruncle.
- Chlorosis.** (G. *chlōros*, green.) A form of anæmia affecting girls at puberty, characterized by its greenish colour.
- Chorion.** (G. *choreon*, skin.) The outer of the two foetal membranes.
- Coccygodynia.** (G. *kokkux*, coccyx; *odynē*, pain.) Pain in region of coccyx due to neuralgia or injury.
- Colpo-perineorrhaphy.** (G. *kolpos*, vagina; *perinaion*, perineum; *raphē*, suture.) Removing a piece of the posterior vaginal wall, suturing the edges, and repairing the damaged perineal body.
- Colporrhaphy.** (G. *kolpos*, vagina; *raphē*, suture.) The operation of narrowing the vagina by removing a piece of its wall and suturing the cut edges.
- Colpotomy.** (G. *kolpos*, vagina; *temnein*, to cut.) Cutting through the vagina into the pouch of Douglas.
- Coma.** (G. *kōma*, stupor.) Unconsciousness occurring in the course of disease or following severe injury.
- Condylomata.** (G. *konduloma*, wart.) A wart-like excrescence near the anus or vulva, seen in cases of syphilis.
- Convulsions.** (L. *convellere*, to pull together.) Violent involuntary contractions of the voluntary muscles.
- Corpuscle.** (L. *corpusculum*, little body.) Usually refers to cells of the blood.
- Cystic.** (G. *kustis*, bladder.) A sac normal or otherwise, especially one containing a liquid or semi-solid.
- Cystocele.** (G. *kustis*, bladder; *kēlē*, hernia.) Bulging of the bladder with the anterior vaginal wall.
- Decidua.** (L. *dēciduus*, falling off.) Lining of pregnant uterus, which is cast off after labour.
- De-hydrate.** (L. *dē*, away; G. *hūdōr*, water.) Removal of water from a substance.
- Diathermy.** (G. *dia*, through; *thermainein*, to warm.) A form of electrical cautery in which the current enters by a large pad on the back and leaves at the point of the particular instrument being used. Also used for warming up local parts of the body.
- Dysmenorrhœa.** (G. *dus*, difficult; *mēn*, month; *rhoia*, flow.) Painful menstruation.
- Dyspnœa.** (G. *dus*, difficult; *pnoē*, breathing.) Difficult or laboured breathing.
- Eclampsia.** (G. *ek*, out; *lampein*, to flash.) An attack of convulsions.
- Ectopic.** (G. *ektopos*, displaced.) Out of normal place: ectopic gestation, a fertilized ovum developing outside the uterus.
- Embolism.** (G. *en*, in; *ballein*, to throw.) Blocking of an artery or vein, by a clot carried in the blood-stream. If pulmonary artery is blocked death from suffocation may occur.

- Embryo.** (G. *endon*, within; *bruein*, to grow.) The foetus during its development.
- Empirical.** (G. *empirikos*, experimental.) Based on experience.
- Endo-cervicitis.** (G. *endon*, within; *cervix*, neck; *itis*, inflammation.) Inflammation of lining of neck of uterus.
- Endocrin.** (G. *endon*, within; *krīnein*, to separate.) Endocrin glands, ductless glands with an internal secretion, *e.g.* the ovaries, adrenals, thyroid, pituitary.
- Endometrium.** (G. *endon*, within; *mētra*, uterus.) Mucous membrane lining the uterus.
- Epithelioma.** (G. *epi*, on; *thēlē*, nipple; *ōma*, tumour.) A cancer consisting of epithelial cells.
- Erosion.** (L. *ērōdēre*, to eat out.) The eating away of a part.
- Exsanguinated.** (L. *ex*, out; *sanguinis*, blood.) Deprived of blood.
- Extravasation.** (L. *extrā*, beyond; *vas*, vessel.) Escape of blood from a vessel into the tissues.
- Fascia.** (L. *fascia*, band.) A sheet of tissue which invests the muscles.
- Fistula.** (L. *fistula*, pipe.) An opening into a hollow internal organ, *e.g.* vesico-vaginal fistula, an opening between bladder and vagina.
- Follicle.** (L. *folliculus*, a little bag.) A small excreting or secreting sac or gland.
- Fornix.** (L. *fornix*, arch.) That portion of the vagina above the level of the external os, thus anterior, posterior and lateral, according to the position.
- Gamete.** (G. *gametēs*, spouse.) Sexual cells, male and female, which unite with each other to form the zygote.
- Hæmatoma.** (G. *haima*, blood; *ōma*, tumour.) A swelling due to effused blood.
- Hæmato-salpinx.** (G. *haima*, blood; *ōma*, tumour; *salpinx*, trumpet.) Collection of blood in the Fallopian tube.
- Hæmophilia.** (G. *haima*, blood; *philein*, to love.) An abnormal tendency to bleed, usually hereditary.
- Hermaphrodism.** (G. *hermēs*, Mercury; *aphrodītē*, Venus.) Hermaphrodite, an animal which has both male and female sexual organs. There is no reported case in the literature of a human person having both ovaries and testes; all supposed cases are really pseudo-hermaphrodites.
- Hydro-salpinx.** (G. *hydrō*, water; *salpinx*, trumpet.) Collection of watery fluid in a Fallopian tube.
- Hyperæmia.** (G. *huper*, over; *haima*, blood.) Excess of blood in any part of the body.
- Hyperemesis.** (G. *huper*, over; *emēsis*, vomiting.) Hyperemesis gravidarum, the excessive vomiting of pregnancy.
- Hypertropic.** (G. *huper*, over; *trophē*, nutrition.) Excessive enlargement of a part.
- Hypospadias.** (G. *hupo*, under; *spān*, to draw.) Congenital opening of urethra on the underside of penis, or an opening of the urethra into the vagina.
- Hysterectomy.** (G. *hūtera*, uterus; *ectomē*, excision.) Removal of the uterus either by abdominal route or through the vagina.

- Inflammation.** (L. *inflammātus*, set on fire.) Condition of the tissues as a result of irritation.
- Leucorrhœa.** (G. *leukos*, white; *rhoia*, flow.) Any discharge from the genital canal not consisting of blood, pus, water, or fæces; used for excessive secretion of the mucous membrane of the uterus.
- Leukoplakia.** (G. *leukos*, white; *plex*, plate.) A disease characterized by the formation of white patches on the tongue or on the inner surface of the vulva.
- Levator Ani.** (L. *levātor*, lifter.) The muscle that supports and lifts the rectum and vagina, aids defæcation.
- Lithopædion.** (G. *lithos*, stone; *paidion*, child.) A dead foetus which has become calcified.
- Lumen.** (L. *lumen*, light.) The clear space inside a tube.
- Malignant.** (L. *malignans*, acting maliciously.) A condition leading to death.
- Meatus.** (L. *meātus*, passage.) Meatus urinarius, the orifice of the urethra.
- Menopause.** (G. *mēn*, month; *pausis*, cessation.) The age when menstruation normally ceases.
- Menorrhagia.** (G. *mēn*, month; *rhēgnunai*, to burst forth.) Profuse menstruation.
- Menses.** (L. *mensis*, month.) The monthly flow of blood, mucus, and shreds of endometrium from the uterus of woman.
- Menstruation.** (L. *menstruāre*, menstruate.) A physiological function associated with the discharge of the menses.
- Metrorrhagia.** (G. *mētra*, uterus; *rhēgnunai*, to burst forth.) An abnormal uterine hæmorrhage.
- Multicellular.** (L. *multus*, many; *cellulă*, cell.) Composed of many cells.
- Myomectomy.** (G. *mus*, muscle; *ōma*, tumour; *ektomē*, excision.) Enucleation of a fibroid tumour from the uterus.
- Myxœdema.** (G. *muxa*, mucus; *oidēma*, swelling.) A disease characterized by dropsy of the face and hands, due to atrophy of the thyroid gland.
- Nodule.** (L. *nōdulus*, little knot.) A small swelling.
- Œdema.** (G. *œdēma*, swelling.) Swelling due to effusion of watery fluid into the connective tissue.
- Oocyte.** (G. *ōon*, egg; *kutos*, cell.) The unfertilized cell which escaped from a *Graafian* follicle in the ovary when it ruptured. Otherwise called the ovum, egg, or female gamete.
- Oophorectomy.** (G. *ōon*, egg; *pherein*, to bear; *ektomē*, excision.) Excision of an ovary.
- Opsonin.** (G. *opsōnein*, to prepare food for.) An anti-body which makes the bacteria palatable to the phagocyte.
- Paretic.** (G. *paresis*, relaxation.) Affected with paresis, paralysis.
- Pedunculated.** (L. *pedunculus*, a stem.) Having a stem.
- Perineorrhaphy.** (G. *perinaion*, perineum; *raphē*, suture.) The operation of making a new perineum.
- Phagocytes.** (G. *phagein*, to eat; *kutos*, cell.) Cells which destroy bacteria by enveloping and absorbing them.

- Placenta.** (L. *placenta*, a flat cake.) The organ, partly maternal and partly foetal, situated in the pregnant uterus which is the means of conveying nourishment to, and waste products from, the foetus.
- Plastic.** (G. *plasticos*, to build up.) Tending to build up tissue or restore a lost part.
- Polypus.** (G. *polus*, many; *pous*, feet.) A pedunculated growth from a mucous surface.
- Prophylactic.** (G. *pro*, before; *phulasso*, to guard.) Tending to prevent a disease.
- Protozoon.** (G. *prōtos*, first; *zōon*, animal.) A single animal cell belonging to the next lowest form of life to a bacterium.
- Pruritus.** (L. *prurire*, to itch.) Pruritus vulvæ, itching of external genital organs of the female.
- Pseudocyesis.** (G. *pseudēs*, false; *kukēsis*, pregnancy.) A condition in which a woman thinks she is pregnant when she is not.
- Purulent.** (L. *purulentus*, containing pus.) Consisting of pus.
- Pus.** (L. *pus*.) The result of inflammation, a secretion consisting of dead cells and a thin fluid.
- Pyæmia.** (G. *puon*, pus; *haima*, blood.) Septicæmia characterized by the formation of local abscesses.
- Pyo-salpinx.** (G. *puon*, pus; *salpinx*, trumpet.) Collection of pus in Fallopian tube.
- Salpingectomy.** (G. *salpinx*, trumpet; *ektomē*, excision.) Removal of a Fallopian tube.
- Salpingostomy.** (G. *salpinx*, trumpet; *stōma*, mouth.) The formation of a new opening into a Fallopian tube, the lumen of which has closed, in an attempt to cure one form of sterility.
- Saprophytes.** (G. *saphros*, putrid; *phuton*, plant.) Bacteria living on dead or decaying organic matter.
- Sarcomas.** (G. *sarx*, flesh; *ōma*, tumour.) A malignant fleshy tumour.
- Sclerosis.** (G. *sklērōsis*, hardness.) An induration or hardening.
- Sebaceous.** (L. *sebaceus*, pertaining to sebum or suet.) Sebaceous gland, one secreting an oily substance.
- Sordes.** (L. *sordēs*, filth.) The mixture of epithelial debris and bacteria which collect on teeth and lips in low fevers.
- Spermatozoon.** (G. *sperma*, seed; *zōon*, animal.) The male gamete or sexual cell.
- Spore.** (G. *spōrā*, seed.) The resting stage of a bacillus when its environment is not conducive to its reproduction, to be transformed into a bacillus when the surroundings are again favourable.
- Squamous.** (L. *squāmōsus*, scaly.) Plate-like.
- Suppuration.** (L. *sub*, under; *puon*, pus.) The formation of pus.
- Tertiary.** (L. *tertiarius*, third in order.) Tertiary syphilis, or its third stage.
- Thrombus.** (G. *thrombos*, clot.) Clot in a blood-vessel remaining at the point of its formation.
- Toxæmia.** (G. *toxikon*, poison; *haima*, blood.) Poisons produced by the body cells or by bacteria.
- Trachelorrhaphy.** (G. *trachēlos*, neck; *rhapḗ*, suture.) The repair of a lacerated cervix uteri.
- Unilateral.** (L. *ūnus*, one; *latus*, side.) Affecting one side only.

Uræmia. (G. *ouren*, urine; *haima*, blood.) The presence of urinary constituents in the blood.

Ventral Fixation. (L. *venter*, belly; *fixus*, fixed.) The cure of uterine retroposition by fixing the uterus to the abdominal wall.

Vesicular. (L. *vesicula*, a little bladder.) Composed of small sac-like bodies.

Vulvitis. (L. *vulva*; G. *itis*, inflammation.) Inflammation of the vulva.

Zygote. The fertilized cell resulting from fusion of the oocyte and spermatozoon. (*See* Gametes.)

Zymosis. (G. *zumoein*, to ferment.)

Zymotic. An infectious or contagious disease.

INDEX.

A

Abdomen, 41, 189, 239, 242, 402
 belts, 41, 138, 392
 examinations, 256
 operations, 299, 309, 335, 384
 Abnormal pregnancy, 79
 Abortion. See Miscarriages
 Abscess, 179, 182, 185, 195, 207, 405
 Accidents, 11, 333
 Acetabulum, 1
 Acid, picric, for skin preparation, 338
 Adeno-carcinoma, adenoma, adenomyoma, 211, 229
 After-birth. See Placenta
 Age of foetus, 39
 Albuminuria, 47, 194, 245, 304
 Alcohol, 41, 203
 Alterations of abdomen, 239
 blood supply, 33
 breasts, 15
 cervix, 30
 pregnancy, 30
 senile, 14
 uterus, 30
 Alveoli, 15
 Amenorrhœa, 60, 86-93
 Amnion, 35, 36, 64
 Anaphylaxis, 177
 Anatomy of bones of pelvis, 1-4
 breasts, 15
 excretory organs, 8, 14-18
 genitals, 6-14
 glands, 6, 10, 15, 20, 120
 muscles, 4, 9, 11, 18, 63
 Ante-natal conditions, 40, 44
 centres, 44
 Ante-partum hæmorrhage, 26, 30, 54, 58, 79

Ante-version, ante-flexion, 12, 14, 138
 Anti-bacterial, 166-178
 Antiseptic technique, 309, 346
 Applicator, 292
 Arrangements for labour, 68
 operations, 312
 Artificial respiration, 178, 405
 rupture of membranes, 57
 Ascending inflammation, 179
 Aseptic technique, 309
 Atrophy, 14, 221

B

Backache, 110, 112, 135
 Backward displacement, 129
 Bacteria, 157-175
 Bag, Champetier de Ribes', 57
 149
 of membranes, 30, 62, 65
 Baking, 255
 Bartholin's cyst, 211-212
 gland, 6, 120, 179, 182, 206, 211, 212, 317
 Baths, 26, 41, 49, 68, 155, 182, 208, 334, 410
 Bearing down, 65
 of a nurse, 249
 Bed, labour, 68
 sores, 198
 water, 198
 Belts, 41, 138, 392
 Bi-manual compression, 76
 examination, 256, 260
 Bladder, 12-14, 18, 134, 147-155, 190, 274-276, 307, 378, 408
 Blasto cyst, 30, 35, 79, 81
 Bleeding. See Hæmorrhage
 Blindness, 48, 200-207

- Blood examination, 296
 serum, 166, 169
 "show," 61
 sinuses, 34
 tests, 169-176, 202
 transfusion, 77, 282-287
 in urine, 191, 304
 Board, Central Midwives, 68
 Boiling, 255
 Bottles, hot-water, 198, 361, 362, 369, 401
 Bowels, 187, 221, 307, 379, 380
 Breast, 15-42
 Broad ligaments, 12, 233
 Bursting, 406
- C
- Cæsarean section, 57, 344
 Cancer and new growths, 27, 95, 122, 128-186, 211-247
 treatment of, palliative, 235
 radical, 342, 407
 radium, 234, 236, 289
 X-ray, 214, 237, 287
 Caput succedaneum, 65
 Carcinoma, 96, 122, 211
 Care, ante-natal, 40, 44
 in catheterization, 150, 271
 in douching, 268
 of eyes, 70, 72
 of gloves, 320, 377
 of gynæcological patient, 335, 360
 of hands, 199, 319
 of hot-water bottles, 198, 367, 369
 of obstetric patient, 68, 71
 of pessaries, 143
 of teeth, 43, 297, 300
 Carunculæ myrtiformes, 7
 urethral, 147, 212, 358
 Catheter, 18, 150, 271-274, 300, 331, 379
 Cellulitis, 102, 189, 267
 Central Midwives Board, 68
 Cervix, 8, 10, 12, 34
 amputation, 350, 381
 cancer, 229
 dilatation, 57, 61, 62, 106, 115, 348
 Cervix, erosion, 121, 184, 189, 230
 laceration, 73
 Champetier de Ribes' bag, 149
 Chancres, 201, 209
 Change of life. See Menopause
 uterus, 27
 Chemical sterilization, 252
 Child, 37, 59, 63, 65, 67, 70, 72
 Chorio-epithelioma, 96
 Chorion, 33, 35, 79
 Chorionic villi, 35-38, 81
 Circulation, foetal, 38
 placental, 38
 villous, 38
 Climacteric. See Menopause
 Clitoris, 6
 Clothes, baby's, 73
 labour, 69
 operation, 308
 pregnancy, 40
 theatre nurse's and sister's, 320
 Clumping, 285
 Coccygodynia, 111
 Coccyx, 1, 2
 Coitus, 11, 29, 114
 Colporrhaphy, colpolomy, 346, 350
 Commission, Royal, on Venereal Diseases, 200
 Compression, bi-manual, 76
 Conception, 29
 Condition, ante-natal, 40
 of hymen, 7, 92
 Condylomata, 203
 Congenital displacements and malformations, 114, 130
 syphilis, 200
 Conjugate, diagonal, 3
 true, 3
 Constipation, 19, 88, 124, 403
 Contagion, 200, 203, 208
 Contractions, absence of, 75
 uterine, 30, 35, 61, 64, 65, 66
 Convulsions, 47, 155
 Cord, 38, 68, 72, 139
 Corpus luteum, 15-22
 Council, General Nursing, 54
 Curettage, 184, 317, 348, 381
 Cystitis, 18, 149-190, 403
 Cystocele, 129, 137, 142
 Cysts, 211, 237, 340, 344, 381

D

Dabs and swabs, 251, 316, 333
 Dangerous Drugs Act, 105
 Date of labour, 59
 Decidua, 12, 26, 30, 36
 Defæcation, painful, 186, 236
 Deficient retraction, 74
 Degeneration, 226
 Delayed labour, 62
 Dentistry, 300
 Dermoids, 238
 Diagonal conjugate, 3
 Diarrhœa, 194, 196, 252, 409
 Diathermy, 356
 Diet, 41, 47, 53, 197, 308, 384, 392
 Diptheritic vulvitis, 181
 Direct uterine pressure, 62
 Direction of vagina, 9
 Discharges, 24, 83, 119, 128, 184, 206, 229, 235, 266, 270
 Disease, malignant, 96, 98, 124, 211, 248, 342
 reproductive tract, 86
 venereal, 200
 Disinfection, 251-255
 Displacement, 129-146
 Distension of bladder, 148, 154
 gastric, 398
 intestinal, 398
 uterine, 227
 Disturbances of menstruation, 86
 micturition, 233-236
 Donor, 284, 285
 Douche, 11, 58, 75, 99, 125, 140, 208, 235, 253, 266-270, 299, 382
 Douglas's pouch, 8, 9, 12, 18
 Dress, 40, 69, 308, 320
 Dressings, 68, 317, 374, 381, 406.
 Ductless glands, 14, 19, 20
 Duties, maternity nurse, 68
 private nurse, 371
 theatre nurse and sister, 320, 322
 ward sisters, 89, 320, 332
 Dysmenorrhœa, 100-106, 185, 220
 Dyspareunia, 11, 111, 340

E

Electricity for incontinence, 151
 Embolism, 233, 404
 Embryonic developments, 37, 247
 End, fimbriated, Fallopian tube, 10, 186
 Endo- and exo-toxins, 159, 167, 172, 193
 Endometritis, 96, 124, 179, 183
 Endometrium, 11, 32, 96
 Enemata, 11, 68, 307, 380, 398, 400, 401
 Ergot, 54, 58
 Erosion, 121, 131
 Examination—ante-natal, 44
 bi-manual, 256
 of urine, 302-306
 Excess of menstruation, 25, 93, 153
 urine, 153
 Exercise, 26, 43, 105
 External genitals, 4, 248
 os, 10, 12, 63
 Extra-uterine gestation, 79-85, 98
 Eyes, care of, 70, 72

F

Fæces, 19, 122, 397
 Fallopian tubes, 11, 13, 14, 29, 79, 81, 185, 211
 inflation of, 116
 False incontinence, 151
 Female genitals. See Anatomy
 Femoral thrombosis, 221, 404
 Fertilization, 29, 59, 79
 Fever, puerperal, 193
 Fibroids, 96, 182, 211, 217, 221, 228, 287, 350
 Fits, 48
 Flooding. See Hæmorrhage
 Floor, pelvic, 4, 13, 136
 Fœtus, 30, 36, 39, 60, 63, 65
 Follicles, Graafian, 21-22, 79
 primordial, 21
 Forceps, 49, 59
 Foreign bodies, 123, 182
 Fossa navicularis and fourchette, 7
 Fowler's position, 264, 398

Frequent micturition, 60, 133, 137,
153, 187, 191, 239
Fundus, 12, 31
Furniture of theatre, 312, 365

G

Gamgee jacket, 308
Gangrene, 181
Gauging bladder, 275
Genital organs. See Anatomy
Germ-infection, 147, 156, 179, 193
epithelium, 21, 22
Gestation. See Pregnancy
extra-uterine, 79-85
Getting-up, 392
Glands, 6-11, 15, 17, 19, 20, 94,
120
Gloves, 199, 208, 251, 254, 319,
320, 322, 372, 377, 340
Gonococcus, 158, 205
Gonorrhœa, 14, 125, 182, 186,
205-216
Graafian follicles, 21, 22, 29, 79
Gravid uterus, retroverted and
incarcerated, 131
Growth, foetal, 39
Gummata, 204

H

Hæmatoma, 405
of vulva, 215
Hæmorrhage—
ante-partum, 30, 54, 58
malignant disease, 28, 222,
225, 231, 241, 243
menorrhagic, 93-99
post-menstrual, 27, 231, 234,
243
post-operative, 401
post-partum, 60, 66, 73-75
pre-menstrual, 97
traumatic, 73
unavoidable, 26
Hæmorrhoids, 18, 221, 239
Handing threaded needle, 326
Hands, 199, 252, 273, 319
Hard chancre, 201
Head, foetal, 3
Heart disease, 88, 204
foetal, 39

Hermaphroditism, 247
Hernia, 216, 392, 407
Hiccough, 403
History, taking, 178
Hospital, Middlesex, 84, 236, 309,
398
Hot-air baths, 155
baths, 49
packs, 49
water bottles, 198, 361, 362,
369, 401
Hymen, 7, 92, 248
Hypertrophy, 30, 33
Hysterectomy, abdominal, 57,
225, 227, 344, 382
vaginal, 346, 382
Hysteria, 147, 153

I

Iliac bone and sacro-iliac joint,
1, 2
Immunity, 166-178
Incarcerated gravid uterus, 133
Incidence of cancer, 229
fibroids, 217, 220
Incomplete abortion, 52, 122
Incontinence, 134, 150-153, 409
Inflammation, 179-192
Influence of ductless glands, 14,
19, 20
Injections :
anti-toxic, 167, 195
enemata, 307, 380, 398, 400
intravenous, 49, 77, 155, 296
rectal, 49, 155, 395, 398
taking history before, 178
Injuries, 246
Innominate bone, 1, 2
Inoculation, 161
Insanity, 78, 200
Insomnia, 78, 127
Instruments, gynæcological, 339-
359
Internal distension, 398-403
genital organs, 8, 14
obstruction, 233-403
os, 10, 12, 63
Intra-abdominal pressure, 13, 14,
65
uterine douche, 75
venous injection, 277

Inversion, 74, 77, 138
 Involution, 131
 Iodine method of skin preparation, 337
 Irritative vomiting, 396
 Ischial bone, 1, 2

J

Jacket, gamgee, 308
 Jaundice, pernicious, 50
 Jenner, 174

K

Kidney, 17, 45
 Knee-pectoral position, 207, 261

L

Labour, 59
 delayed, 62
 induced, 49
 results of, 4, 7, 9, 136, 180, 350
 Lacerations, 4, 7, 9, 75, 136, 181
 Lateral position, 257-260
 Leaflet on menstruation, 104
 Leucorrhœa, 120, 123, 124, 184, 186, 220, 232, 266
 Leukoplakia, 127, 213
 Levatores ani, 4
 Ligaments, 13, 344
 Ligatures, 314, 341, 352, 370
 Light, 163
 Lighting arrangements, 370
 Lipiodol, 116, 117
 Liquor amnii, 62
 Lister, 158
 Lithopædion, 82
 Lithotomy position, 208, 258, 262, 329, 374
 Lochia, 78
 Lying-in period, 77

M

Macintoshes, 253, 269, 360, 369
 Major, minor operations, 263, 339-375, 364-371
 plan of tables for, 366
 positions for, 257
 sterilized requisites for, 313

Majora, minora labia, 56
 Male sterility, 113
 Malformations, 247
 Malignant disease, 93, 214, 229, 239, 287
 palliative treatment, 235
 radical, 234, 342
 radium, 215, 236
 X-ray, 214, 215
 Malposition, 13, 129
 Manometer, 116
 Masks and veils, 322, 372
 Maternity nursing, 67
 patients, 68
 Maturation, 21
 Meconium, 73
 Membrana granulosa, 21, 22
 Membranes, artificial rupture, 57
 early rupture, 62
 late rupture, 64
 separation of, 66, 71
 Membranous dysmenorrhœa, 101, 106
 Menopause, 15, 26, 222, 225, 232
 Menorrhagia and metrorrhagia, 93-99, 135, 184, 186, 219
 Menstruation, 24, 26
 disturbances of, 25, 86-118
 hidden, 86
 pituitary and thyroid influencing, 20
 rational view of, 104-106
 Metchnikoff, 170
 Micro-organisms, 14, 156-165
 ultra, 165
 Micturition, 18
 after and before operations, 307, 378
 disturbances of, 133, 147-155, 206, 233
 Middlesex Hospital, 84, 236, 309, 398
 Midwives, 68
 Central Board, 68
 Milk, breast, 15, 77
 Miscarriages, 26, 50-54, 122, 200, 223
 criminal, 50
 inevitable, 52, 53
 nursing, 53
 results of, 52, 131
 retroversion, producing, 132
 sterility after, 52

Miscarriages—

- syphilis, producing, 201
- threatened, 52, 53, 245
- tubal, 81
- varieties of, 52

Misplacement, 13, 129

Mole, vesicular, 122

Mons veneris, 5

“Morning sickness,” 42, 60

Mouth, 43, 300

Mucous :

- discharge, 120
- membrane, 14, 220
- polypi, 212, 217, 350
- tubercles, 203

Mucus in urine, 192

Mullerian duct, 247

Multiparæ, 31, 46, 66

Myoma, myomectomy, 225, 227, 344

statistics of mortality, 227

Myrtiformes carunculæ, 7

Myxœdema, 94

N

Nausea, 42, 363, 384, 396

Needle technique, 324-326

Reverdin's, 326, 344

Neo-salvarsan, 177

Nervous urinary mechanism, 147

Neurotic vomiting, 50, 397

New growths and tumours, 211-247

Nipples, 15, 42

Nocturnal incontinence, 152

Normal labour, 60

menstruation, 22, 104

pelvis, 3

pregnancy, 29

saline, 49, 315, 394

Novarsenobillon, 296

Nurse : accidents, 11, 333

assistance of, 68, 77, 125

bearing of, 249

dress, 68, 321

duties of private, 371

fully trained, 236, 249

gynæcological, 249, 319, 339, 371

hands of, 69, 199, 252, 273, 319

Nurse—

in X-ray department, 288

maternity, 68

theatre, 312, 319, 327

Nursing : complications, 394

Council, General, 54

gynæcological, 249, 407

maternity, 68, 76

miscarriages, 53

septicæmia, 196

venereal diseases, 208, 209

vomiting, neurotic or pernicious, 49

Nymphæ, 6

O

Obstruction, intestinal, 233, 403

Obstructive vomiting, 397

Oedema, 48

Oestrous cycle, 22

Offensiveness, 52, 122, 214, 222, 235, 406

Oocyte, 21, 29, 79

Operating room, 364-375

theatre, 312, 328, 365

Operations and instruments, 339-375

after and before, 299-308, 407

demeanour during, 333

preparations and requisites, 299, 308, 364

time-table, 384

Ophthalmia, 207

Opium, 53, 105, 300

Organisms, 156-165

Organs, genital and excretory, 2-18, 119, 247

Orgasm, 115

Os, external and internal, 61, 62

Out-patient department, 359

Ovarian pregnancy, 29, 80

Ovary, 10-15

abscess of, and ovaritis, 179, 188

cancer, 211-244

cysts and solid tumours, 237, 246

diseases and inflammation, 188, 237

oophorectomy and ovariectomy, 344

Ovary—
 prolapse, 142
 secretion, 15
 Overalls, veils, masks, 320, 372
 Overlaying, 73
 Ovulation, 22
 Ovum, 21, 22, 33, 35, 59, 113
 Ox-gall enema, 399
 Oxygen, 178, 405

P

Packing. See Tamponading.
 Packs, 49, 199
 Pain: abdominal, 107, 112
 in cancer, 233, 235
 labour, 61, 62
 menstruation, 99
 post-operative, 394
 Painful defæcation, 186, 236
 micturition, 147, 154, 206,
 233, 379
 Painless contractions, 30, 61
 Palliative treatment, 235
 Parturition, 58
 Passing catheter, 191, 271, 337
 Pasteur, 156
 Pathology, 45, 78, 86, 119, 127,
 147, 156, 179
 Patient, midwifery, 71
 gynæcological, 360
 positions, 256, 373
 Pedicles of tumours 223, 242
 Pelvic cellulitis, 189
 floor, 14, 136
 hæmatocele, 81
 peritonitis, 132, 188
 Pelvis, 1-4
 contracted, 138
 Perineal body, 7, 9
 lacerations, 4, 7, 9, 75
 Perineorrhaphy, 350, 378, 383
 Period, lying-in, 77
 menstrual, 26, 104
 Peritoneal inflammation, 179, 188,
 281
 vomiting, 402
 Peritonitis, 14, 187, 402
 Pernicious anæmia, 94
 jaundice, 45, 50
 vomiting, 49
 Pessaries, 126-146
 Pflüger, tubes of, 21

Physiology, 20, 28
 Picric acid method, 338
 Placenta, 36, 64, 66, 70
 prævia, 30, 54-55
 Placental polypus, 228
 Plugging. See Tamponading
 Polypi, 228
 Polyvalent serum, 173
 Positions, 256-265, 398
 Post-operative time table, 384
 partum hæmorrhage, 73
 Pouch, Douglas's, 8, 9
 Pregnancy, 30-58
 breasts in, 15
 eclampsia and toxæmia in,
 45-47
 kidney, 45, 46
 ovarian, 29
 tubal, 29
 venereal diseases and, 200
 vomiting in, 45, 49, 50
 Preparations for labour, 63
 operations, 299-374
 Pressure, 14, 148, 220, 226, 237
 Primigravida, 31, 46, 62
 Procidentia, 136
 Prolapse, 4, 9, 136, 141
 Protozoa, 156, 163
 Pruritis vulvæ, 125, 126, 214
 Pseudocyesis, 17
 Puberty, 20
 Public library, 84
 Puerperal sepsis, 78, 121, 124, 161,
 194, 199
 insanity, 78
 Pulse, 299
 Pyæmia, 158, 180, 194
 Pyelitis, 181, 192
 Pyelo-nephritis, 181
 Pyosalpinx, 183, 187

Q

Quacks, 205
 Quantity, menstrual, 25-93
 urinal, 300, 378

R

Radical treatment, 234, 342, 407
 Radium or Radon, 185, 234, 236,
 289, 296
 dangers of, 294

- Ray, X-, 117, 128, 214, 237, 287, 339
 Reaction tests, 169, 176, 200
 Real amenorrhœa, 87
 Rectocele, 129, 142
 Recto-vaginal fistula, 233, 352
 Rectum, 18, 153, 247
 Recumbent position, 256, 262
 Removal of tumours, 340
 Respiration, 229
 artificial, 178, 405
 Rest, 299
 Results of gonorrhœa, 207
 labour, 4, 7, 9, 136, 180, 350
 lacerations, 4, 79, 136, 181
 miscarriage, 122, 131
 syphilis, 200
 toxæmia, 45
 Retention of placenta, 228
 urine, 18, 77, 133, 147, 189, 200, 233
 Retraction, 61, 66
 deficient, 74
 Retroflexion, retroversion, 12, 14, 129
 Reverdin's needle, 326, 344
 Ribes, de, bag, 57, 149
 Room, anæsthetizing, 360
 operating, 364
 tidying, 375
 ventilating, 77, 198, 377
 Round ligaments, 13, 344
 Royal Commission on Venereal Disease, 200
 Rubber catheter, 272
 enema tube, 380
 gloves, 251, 254, 319, 320, 322, 340, 372, 377
 Rue enema, 399
 Rupture of bladder, 132
 cysts, 24
 Fallopian tubes, 81, 85
 membranes, 57, 62, 64
 pelvic floor, 4, 7, 9
 uterus, 254
 wounds, 406
- S
- Saline, 49, 77, 155, 275, 281, 315
 Salpingitis, salpingectomy, 185, 344
 Salpingo-oophorectomy, salpingo-oophoritis, 207, 344
 Salpingostomy, 344
 Salpinx, hæmato, 211
 Salvarsan, 177, 205
 Sapræmia, 162, 229
 Sarcoma, 211
 School Medical Officers' Association, 104
 Section, Cæsarean, 57, 344
 Semi-prone position, 260
 Separation of placenta, 55, 67
 Sepsis, puerperal, 193, 180
 Septic absorption, 214
 fibroids, 221
 thrombosis, 194
 Septicæmia, 78, 193-199
 Septum of hymen, 7, 92, 248
 Serum, 167-174, 284
 Sex, 247
 Sex-sense, 114
 Shaving, 5, 334
 Shock and hæmorrhage, 54, 401, 408
 "Show," 61
 "Sickness, morning," 42, 60
 Sim's position, 257, 260
 Sinus, 34, 407
 uterine, 34, 66
 Sister, 89, 312, 320, 322, 332
 Skin preparation, 333-338
 Sleep, 78, 196, 376, 384, 395
 Sluggish uterus, 62
 Soft chancre, 209
 Souffle, uterine, 34
 Spermatozoa, 29, 59, 79, 112, 115
 Spread of cancer, 233
 Stages of labour, 59, 149
 Steaming, 255
 Sterility, 112-118, 179, 187, 207, 220
 Sterilization, 191, 251-255, 309, 313
 Still-births, 200
 Sub-involution, 97, 124, 131
 Suppression of menses, 86-93
 urine, 17, 154
 Surgical technique, 309-338
 Suspension, ventral, 138, 344
 Sutures, 316, 324-326
 Swabs. See Dabs
 Syphilis, 200, 205
 Syringing urethra, 272

T

T bandages, 317
 Tampons and tamponading vagina, 54, 57, 58, 75, 99, 149, 183, 208, 270, 339
 Technique, aseptic, 309
 gynæcological, 251
 Teeth, 43
 Temperature, 300
 Tests, diagnostic, 169, 176, 200
 Theatre, 309, 366, 373
 Threatened miscarriage, 53
 Thrush, vulval, 181
 Thyroid gland, 15
 Toxæmia, 44, 45
 Toxin, anti-, 167
 endo, and exo, 159, 172, 193
 Trachelorrhaphy, 350, 381
 Training, 373
 Transfusion, 282-287
 Treatment, cancer, 214, 234, 342
 hæmorrhages and shock, 73, 401, 575
 lacerations, 74
 post-operative, 376
 salvarsan, 205
 serum, 177
 varicose veins, 216
 venereal disease, 200-210
 vomiting, neurotic and pernicious, 49
 X-ray, 214, 215, 339
 Trendelenburg position, 257, 262, 328, 395
 Tubal abortion, 81, 82
 erosion, 82, 83
 gestation, 29, 80-85
 rupture, 81, 82
 Tubes, drainage, 344
 Fallopian, 11, 13, 14, 29, 79, 81, 185, 211
 rectal, 380
 Tubo-ovarian abscess, 185
 Tumours and new growths, 211-247, 287
 Turpentine enema, 386, 398
 Twisted pedicle, 223, 243
 Tying cord, 68
 Tyson's gland, secretion of, 120

U

Ultra-microscopic organisms, 165
 Umbilical cord, 38, 68, 72, 139
 Unavoidable hæmorrhage, 54
 Urea, 47
 Ureters, 17
 Urethra, urethral, 17, 148, 212, 272, 358
 Urethritis, 18
 Urinary organs, 17, 18
 Urine, 17, 18, 77, 147, 155, 194, 271, 200
 testing, 44, 300-306
 Uterus, uterine, 11, 13, 30, 35, 61, 66, 70
 dilatation curettage, 348
 discharge, 119
 disease and inflammation, 180, 185, 211, 217-237
 displacement, 78, 98, 129-146
 douching, 71, 266
 inversion, 76, 138
 pregnant, 30
 rupture, 254
 sub-involution, 97, 124, 131
 treatment, operative and palliative, 235, 282, 342, 348
 under development and malformation, 246

V

Vaccination, vaccines, 174, 195
 Vagina, vaginal, 9, 246
 discharge, 119-128, 206
 douching, 11, 208, 266-270
 inflammation, 91, 179, 206
 malformation, 247
 new growths, 211
 operations, 339, 364, 381, 384
 tamponading, 54, 75, 149, 183, 208
 Vaginismus, vaginitis, 114, 182
 Varicose veins, 216
 Varieties of micro-organisms, 156, 165
 hæmorrhage, 54
 miscarriage, 52
 venereal disease, 200

- | | |
|------------------------------------|---------------------------------|
| Veneris, mons, 5 | Water-bed, 198 |
| Ventilation, 77, 198, 377 | bottles, hot, 198, 361, 362, |
| Ventral suspension, 344 | 369, 401 |
| Vesico- and recto-vaginal fistulæ, | “Whites.” See Leucorrhœa |
| 247, 352, 410 | Widal test, 169 |
| Vesicular mole, 122 | Wolffian duct, 247 |
| Villi, chorionic, 34, 35, 38, 81 | Womb. See Uterus |
| Villous circulation, 38 | Worms, 153 |
| Violet-green method, 336 | Wounds, 405, 408 |
| Vomiting, 42, 50, 362, 396, 403 | |
| Vulva, vulval, 4, 9 | |
| disease, 126, 181, 209, 212, | X |
| 214 | |
| Vulvitis, 179, 181 | X-ray, 117, 128, 214, 215, 237, |
| | 287, 339 |
| W | Y |
| Walls, abdominal, 138, 148, 141 | Yellow discharge, 119, 205 |
| uterine, 141 | |
| vaginal, 141 | Z |
| Ward sisters, 89, 320, 332 | |
| Warts, 209, 238 | Zinc ointment, 196 |
| Wash-out, bladder, 276 | powder, 209 |
| rectal, 400 | Zygote, 30, 35, 79, 81 |
| Wassermann test, 176, 202 | |



